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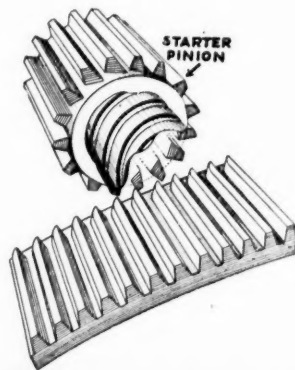
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NEW YORK—THURSDAY, SEPTEMBER 7, 1922

No. 10

71 Per Cent of Cars Sell for Less Than \$1,000

Value of "Under \$1,000" cars will run to \$650,000,000 in 1922. Thirteen companies making cars in this class comprise 15 per cent of total number of manufacturers. Five builders produce 96 per cent of cars in group. Share of business shifts from year to year.

By Norman G. Shidle

Charts and Statistics by Raymond B. Prescott

SEVENTY-ONE per cent of the cars built since 1912 have sold for less than \$1,000. Seventy per cent of the cars produced during the first six months of 1922 were in this price group. At the beginning of this year AUTOMOTIVE INDUSTRIES predicted that 78 per cent of the cars built in 1922 would be in the "Under \$1,000" price class. Thus the error of the prediction was 8 per cent so far as the half year figures represented the proportion for the entire year.

The probable production in 1922 of cars selling for less than \$1,000 is about 1,326,000. This constitutes something like

THIS is article No. 6. It completes the price class series, which was begun some time ago. These articles comprise an accurate and thorough analytical study of production and sales possibilities in the passenger car field, and form the basis for future market studies.

For your convenience, the entire series is again listed:

No. 1—"The Industry As a Whole"—Nov. 17, 1921.

No. 2—"94 per cent of Sales Will Be of Cars Selling Under \$2,000"—Dec. 22, 1921.

No. 3—"Keen Sales Competition in Middle Priced (\$1,000-\$2,000) Field"—March 23, 1922.

No. 4—" \$2,000-\$3,000 Car Production Probably Less in 1922"—May 11, 1922.

No. 5—" \$90,000,000 Business in High Priced Cars During 1922" (\$3,000 and over) July 13, 1922.

No. 6—"71 per cent of Cars Sell for Less Than \$1,000."

70 per cent of the total production, as just noted. Ford will produce about 43 per cent of the total production, while twelve other companies in the "under \$1,000" class will produce about 27 per cent. The production capacity of this group of car makers is about 2,000,000.

This lowest price class is a very large part of total production. Fig. 1 shows the relationship between the class and the total over a period of years. As might be expected, the "Under \$1,000" production curve follows very closely the outline of the total production curve.

It is interesting to note that the "Under \$1,000" curve goes above the nor-

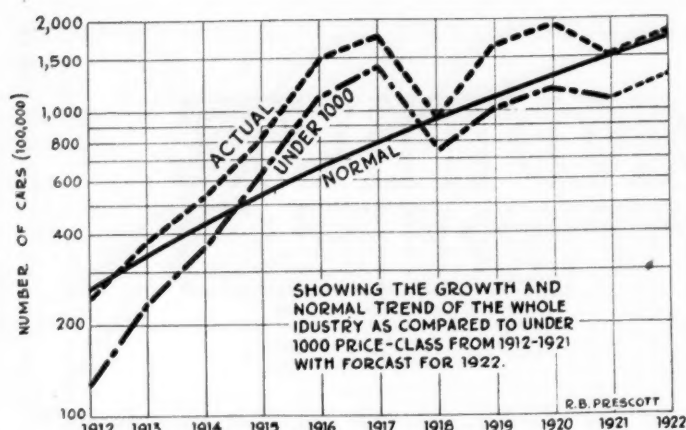


Fig. 1

mal line for the years 1915, 1916 and 1917. War wages brought into the market many buyers who would not have owned a car otherwise. This indicates that more cars were sold in this one price class during these years than would have been sold in all price classes under normal economic conditions.

The 1921 deflation brought the entire industry back to the normal production line, while the "Under \$1,000" curve follows the general trend rather accurately.

Some of the figures concerning this lowest price group are so large that comprehension of them is difficult. They must be used, however, in making market plans and policies.

There are 13 companies making cars which sell for less than \$1,000. This group comprises about 15 per cent of the total number of manufacturers. Between this 15 per cent of manufacturers is divided:

1. 70 per cent of the total business, considered on a production basis.
2. 50 per cent of the total business, considered on a value basis.

The probable gross sales value of 1922 business in this price class is \$650,000,000, of which Ford will probably do something like \$300,000,000.

Considering only the production of this price class, Ford produces about 62 per cent of the total, while four other companies produce about 34 per cent. The remaining 7 companies get 4 per cent.

On a value basis, however, the record is as follows:

1. Ford has about 45 per cent of the price class business, on a gross value basis.
2. 4 other companies have about 46 per cent of the price class business, on a gross value basis.
3. 7 other companies get the remaining 9 per cent.

These figures bring out some interesting points. Ford has a far larger production than these four other companies combined, but the gross value of his business is not quite so large as the combined total of the others.

This value comparison is an important one, since progress and success is too often gaged purely on a production basis. Ford's stupendous production figures for the last few years have been so startling and overwhelming that they have tended to blot out some of the other factors of equal importance in any thorough market study of this price group.

The relative progress of various important companies is shown in Fig. 2. This chart shows the percentage of total car sales obtained by each of five important companies over a period of years. It indicates the share of total business done by the individual companies.

Company "A," Ford, may be mentioned by name be-

cause this organization makes public its production figures.

Ford has always had a larger share of the total business from a production standpoint than any other company, either in its price class or in the industry. Ever since 1912 Ford has maintained approximately the same percentage with comparatively small variations. While Ford's share of the total business is less this year, his share increased last year, while the others were materially declining.

In general, it will be noted that the Ford percentage curve tends to rise when automobile prices in general are rising, while the Ford curve tends to fall when automobile prices falling, although this process was modified in 1921 by reason of maintained prices during the first six months of the year. An opposite trend appears in the case of the other cars.

This tendency is specially noticeable at the present time. The Ford percentage of total production is lower this year than in any year since 1916. The other four companies are all obtaining an increasing share of the total business, company B showing particularly sharp rise.

The percentage of total business obtained by the other four companies, however, has fluctuated during past years far more widely than has Ford's. First one and then the other has had a larger share, the past indicating that similar fluctuations may be expected in the future. New designs, financial abilities or disabilities, and many other factors will continue to affect the leadership.

Company "B" has apparently turned a corner, and is making progress after a steady, though slight decline, during the last three years. The same thing is true of Company "E," although the decline in this latter case

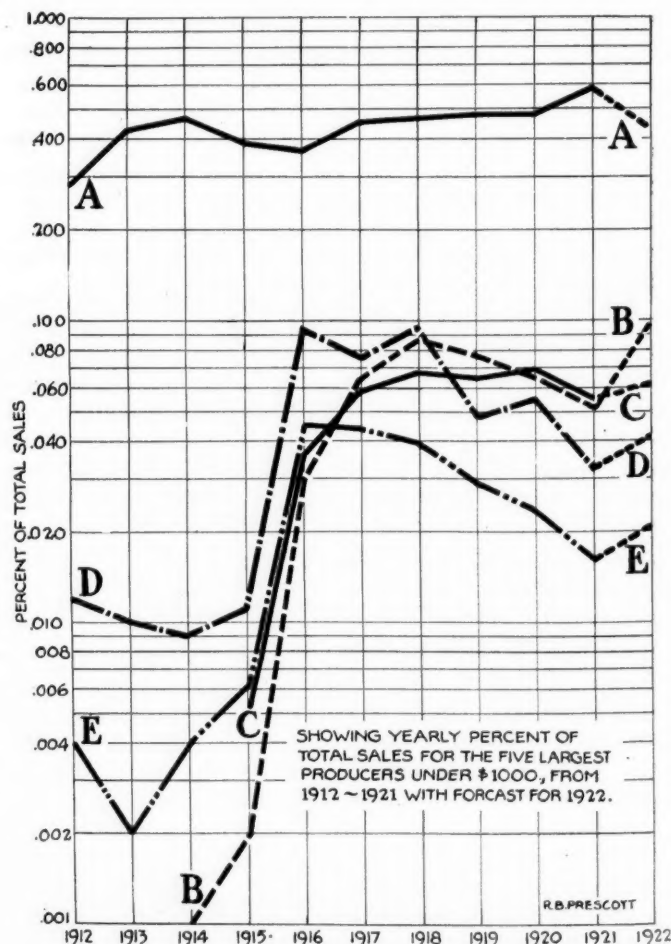


Fig. 2

extended over a period of five years. Past buying habits affect immediate sales materially. Radical changes in a brief time are difficult. Consequently, it is not surprising to see "B's" curve take a sharper upward trend than "E's" because of the relative length of the periods of depression.

Many interesting speculations might be made as regards the Ford percentage decrease and the increase of the other four companies. Since these would be merely speculations, however, they have no place in this particular analysis. The facts presented, however, will give a more sound basis for speculation than a mere consideration of general ideas.

Fig. 3 shows the actual production of several important companies in the "Under \$1,000" price group. Much the same relationships are shown as in the percentage of total business chart in Fig. 2.

Fig. 4 shows the relation between the number of manufacturers operating and the percentage of total production put out in this price class. Fig. 5 presents the same material in tabular form. The trend of the two curves is very similar, but analysis of the various factors indicates that this similarity is probably a mere coincidence. There was no sign of such similarity in any of the other price groups, and there is no logical explanation for the similarity here.

It will be noted that the ratio of production in the "Under \$1,000" class to total production rises steadily as prices decrease, and decreases to a marked degree during periods of rising prices.

The probable production possibilities of this price group have been outlined in a general way. This group presents a bit different problem, however, than the higher price classes. In a sense this low price group

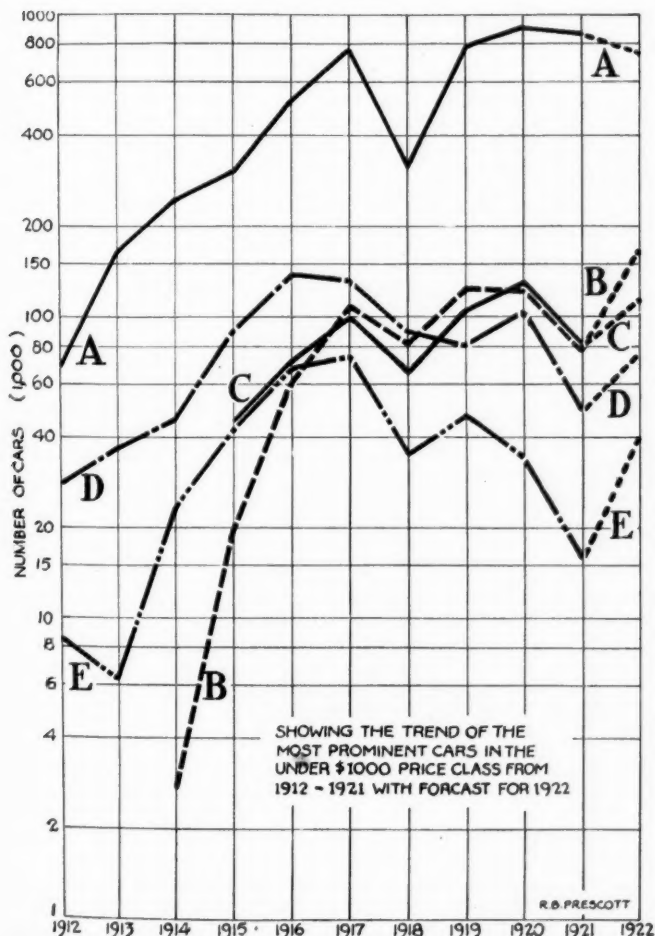


Fig. 3

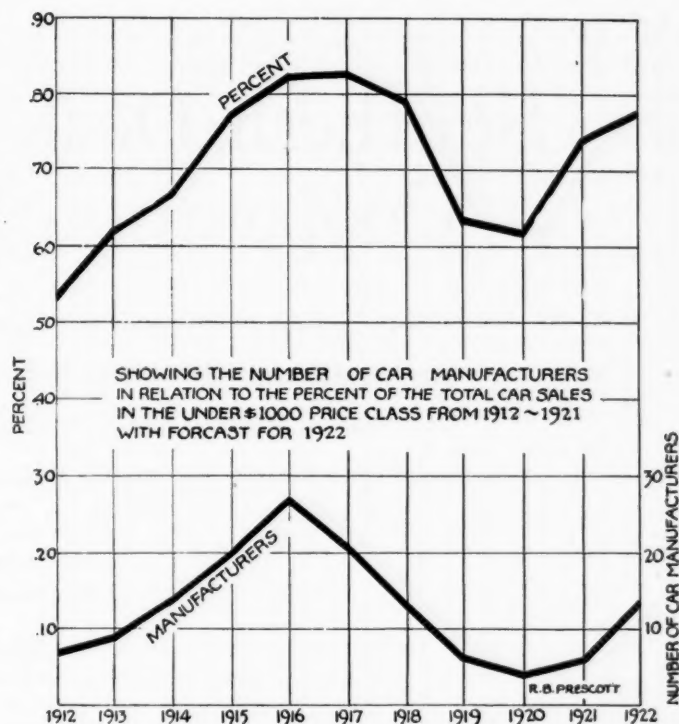


Fig. 4

Companies Manufacturing Cars in the "Under \$1,000" Price Class

	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922
Total number...	7	9	14	20	27	21	13	6	4	6	13
New	0	1	5	5	2	0	0	0	0	1	1
To higher price class	0	1	2	0	0	5	6	7	2	0	0
From higher price class...	0	1	2	2	7	0	0	0	0	1	7
Out of business	0	0	0	1	0	1	2	1	0	0	0

Fig. 5

may be said to be the basis upon which all price group sales possibilities are determined.

The ultimate limit of sales in this group is the limit of transportation needs in this country. Design, production and sales methods are all tending toward a general lowering of both original and upkeep cost. It is difficult to predict what the next ten years will bring forth. Certainly the low priced car will be the one which will pioneer the wider transport opportunities.

Twelve million two hundred and forty thousand cars have been produced since 1912, including the first six months of 1922. Of this number 8,657,000 have sold for less than \$1,000; 71 per cent of all the automobiles made. The gross value of all cars made in this price group since 1912 is \$4,842,130,000 of which Ford's comprise \$2,681,410,000. It seems incredible that anyone could rate as a luxury a unit costing less than \$1,000, which has the transportation usefulness of the automobile. Out of this 8,657,000, Ford has made 5,473,000. The luxury discussion ought soon to become a thing of the past.

There are important additions to the competition in this lowest price class which are just getting under way. Just how far these new cars will operate to actually widen the market possibilities of the field cannot be determined immediately. They will undoubtedly have this effect to some extent. Whatever business is done by the newcomers will be largely taken away from those already in the field.

Consequently, the trend of events in this price class will be particularly interesting during the next few years. In no other price group does dollar for dollar service value influence buying to so great an extent as in "Under \$1,000" class.

Southern Dealers Want Greater Cooperation from Factories

Sales campaigns adapted for Northern use do not always fit Southern conditions. Factories lack intimate knowledge of territories. Dealer education in business and selling methods needed. Financing and credits constitute major problem for Southern dealer.

By James Dalton

IT is not difficult to find automobile dealers in the South who feel that they get little co-operation from their factories. This feeling is not the result of a grouch or inability to make sales. It is shared by some of the most successful automotive merchants.

The plaint is based on the contention that factory sales departments map out some kind of sales campaign which sounds good to them and then try to apply it to the country as a whole instead of making it elastic enough to fit the different sections. Some sales managers, it is asserted, can see no reason why a plan that works well in the Dakotas should not work equally well in Alabama.

This grievance applies to some factories, but there are others which seem to regard the South as a foreign country and try to do business there much as they would in Argentina. Their dealers get even less assistance than do those whose sales departments work out blanket ideas which they seem to think will apply equally well everywhere.

Ignorance of conditions in the South is one of the charges laid most often at the door of Northern houses trying to do business in that section. Southerners are proud of the South and they believe it has the greatest future of any section of the country, but they feel far less prejudice against the North than is generally believed. They will patronize home industry as far as they can, naturally, but they have not the slightest objection to doing business with the North. They do feel, however, that Northern houses which expect to get Southern trade should give greater consideration to a study of the market.

It is only fair to say that a half dozen or so companies which manufacture the passenger cars most popular in the South do make some effort to study market possibilities and make allotments on a more or less scientific basis. They listen somewhat sympathetically to the recommendations of their dealers and profit as a result. If there is any shortage of cars, however, and the supply fails to equal the demand it is the Southern dealer who is most likely to suffer. New models generally are sent south after the rest of the country is supplied.

When sales are at their peak successful dealers in the South spend a good share of their time trying to figure out schemes likely to wring shipments out of factories. The path of the branch manager in that section is not one of roses and he must be a diplomat par excellence to keep his dealer organization satisfied. When dealers are called in conference they are likely to wrangle in-

terminably because they feel that the other fellow is getting the best of the deal in supplies of cars.

One man who is now a branch sales manager declared factory sales departments seem unable to understand why it is that a dealer in one county can sell cars and a dealer in the next county can't. The population may be the same and on the surface the prospects may be equally good, but no consideration seems to be given to the fact that the cotton crop in the successful dealer's county has been good and an utter failure in the county of the dealer who is making no sales.

The North and the South are coming closer together year by year and there is little sectional antagonism. So far as the great mass of Southerners is concerned the war is over and they are glad it ended as it did. Generally speaking, they know much more about the North than Northerners know about the South. Most of the younger generation have been North and they know what it looks like. There are still a great many people in the North, however, who think all of Alabama, Georgia and Mississippi are covered with tropical vegetation and that they are a land of perpetual summer.

Sectional pride is strong and the pride in the South has been hurt because such a large section of the North thinks of it as an almost exclusively agricultural section almost devoid of industrial interests. Up to the time of the Civil War the South had few factories because it didn't want them. For a good many years after the war it had few because there was no capital to build them. The South was ruined financially by the conflict and it had to depend largely upon Northern capital for its industrial development. This capital increased steadily in volume and then Southerners began to accumulate money of their own. They did not hesitate to invest this money in home enterprises. The result has been an almost unbelievable industrial development in the last decade. This progress has been as nothing, however, compared with that which the next ten years will bring.

WISE automotive manufacturers will be the ones who devote real energy and study to the building up of high-class distributive organizations which will take advantage of the business to come.

The surface of the automotive market in the South scarcely has been scratched and its potentialities are tremendous. Taking the section as a whole it has fewer motor vehicles per capita than any other in the country.

Alabama, for example, has a population of 2,348,000 with a total motor vehicle registration of 87,129, while Iowa, with a population of 2,404,000, has 460,000 motor vehicles. It is true that Alabama has a white population of only 1,447,000, with 900,000 negroes, while the white population of Iowa is 2,384,000, but even on that basis Alabama should have at least twice as many motor vehicles as it has.

Georgia has a white population of 1,689,000, while the total population of Nebraska is only 1,296,000, and yet Georgia has 126,500 motor vehicles, while Nebraska has 216,902.

THESE illustrations are fairly typical of the South as a whole, and they disclose something of the future sales possibilities. It is not the contention that each Southern State should have as many motor vehicles as the states with approximately the same population, but the time is coming and coming soon when the differential will be by no means as great. The number of potential first buyers in the South is vastly greater than in the North and Middle West and dealers down there will be doing a lot of fresh business without trade-ins while other sections will be depending largely on replacements.

The South to-day is not the most prosperous section of the country, but it is not by any means in a pitiful plight. Conditions are so much better than they were a year ago that the people down there feel quite contented. Many merchants say they have much difficulty in making collections, but they consider most of the bills good and are not disturbed over the outlook. The South never was as close to a cash basis, even in the cities, as the North and West. If you don't have charge accounts at some of the stores it is assumed something must be wrong with your credit.

Deflation and depression didn't hit the South any harder than other sections of the country, contrary to the general belief. The difficulty was that farmers, big and little, had been prosperous so long they had come to believe there never would be a turn. They had built up no substantial reserves of cash. Cotton growers were badly advised and held on to their crops for higher prices long after the bottom dropped out of the market.

Lacking reserves, the blow hit Southern farmers harder than those in some other sections, but at that bankers have been surprised at the amount of cash dribbling out of the rural districts. It is stated that a large proportion of the fertilizer used for this year's crops was paid for in cash. Country banks believe their small creditors haven't wanted them to know they had any real money.

When times are good the majority of Southern farmers don't stop to consider whether they can afford something they want, but merely whether they can get it. When prosperity was at its height, large planters felt that there was nothing too good for them in the way of a motor car. Even the negro tenant farmers went as

far as they could in the same direction. A great many of them had motor cars and there were more than a few of them who drove automobiles in the \$3,000 price class.

With the coming of the slump, however, many of those in both classes had to get rid of their cars for whatever they would bring. A very large number had been sold on time and they were taken over by dealers, bankers and finance companies. The consequence was that used cars were literally a drug on the market. They couldn't be sold and many dealers went into bankruptcy. The leading truck dealer in Chattanooga, for example, declares the banks and warehouses are his worst competitors even now.

The percentage of cars sold on time in the South probably is larger than in any other section of the country. Cash sales are the exception. It must be admitted that many of the dealers are not good business men. A car in the \$3,000 class recently changed dealers in a good-sized city. The son of one of the wealthiest men in the city asked one of the salesmen for the new dealer to take in his old car, of the same make, purchased from the original dealer, in exchange for a new model. The sales manager made a quiet investigation and found the "prospect" still owed \$500 on the old car. This incident may not be typical, but it is illuminating.

Dealer financing is a troublesome problem. Those who are strongest do it through their banks and banks in the larger cities probably carry more automobile paper than do those in cities of similar size in other sections. Dealers whose line of credit is limited do their financing through finance companies and the operations of these institutions are steadily ex-

HERE is the suggestion to car and truck manufacturers made in three or four Southern cities:

"Why wouldn't it be a wonderful idea for the factories to send down here men who are real experts in financial methods and have them install systems for the dealers? A good many of our fellows can't tell the difference between a balance sheet and a menu card.

"They don't know how to keep track of overhead or depreciation or much of anything else. They don't know how to plug up leaks or find out where they are losing money.

"Some of them think they are losing money on their service work, when as a matter of fact they aren't returning a profit because of the big allowances they make for used cars."

panding in the South.

Trading still is a serious problem, but it is not as serious as it was. With returning prosperity the market has become stronger and it is easier to dispose of used cars. Then, too, dealers have learned that there is no profit in paying more for a used car than they can get when they sell it.

THERE are many live wires among the dealers in the South, but there are not enough good business men among them to go around and as a consequence some companies are poorly represented in a good many places. That undoubtedly is the reason why certain lines of cars are found in large numbers in some places and scarcely at all in other places of similar size. With the building up of dealer organizations sales will become more nearly uniform. Naturally, the best dealers are found handling the lines most universally popular.

In some cities dealer organizations are strong and in some they are decidedly weak. For instance, the secretary of the dealers' association in one of the largest cities in the South is a combination lawyer and real estate dealer. He has no direct personal interest in the sale of cars and never did have.

Competition for dealers is keen, just as it is every-

where, but when successful automotive merchants are asked why their neighbors, who handle good cars, fail to make sales, they will tell you that it is partly the factory's fault. They say the dealer who is not a trained business man has had little assistance and few helpful suggestions from his factory. It seems to be taken for granted that he knows his business. Here is one suggestion made in three or four cities:

"Why wouldn't it be a wonderful idea for the factories to send down here men who are real experts in financial methods and systems and have them install such systems for the dealers? A good many of our fellows can't tell the difference between a balance sheet and a menu card. They don't know how to keep track of overhead or depreciation or much of anything else. They don't know how to plug up leaks or find out where they are losing money. Some of them think they're losing money on their service work when as a matter of fact they aren't returning a profit because of the big allowances they make for used cars. They can't distinguish between essentials and non-essentials."

There seems to be considerable merit in this suggestion and there is no apparent reason why it couldn't be applied profitably to all sections of the country. These men would be giving the dealer real, practical help, making him a better business man, returning greater profits not only to himself but to his factory.

ANOTHER subject which needs to be taught the Southern dealers is service. They aren't quite keeping up with the procession in this respect, generally speaking. Charges are too high and they make the owner discontented. Getting any kind of service in the smaller towns on the less widely used makes of cars is a difficult matter. This does not tend to make motor vehicles popular and factories might well jump into the breach, even without a profit, in preparation for the splendid market in prospect in the near future for those in the best position to take advantage of it.

Dealers in the cities and larger towns who handle popular lines are doing a good business and have been ever since May. They have had no sharp seasonal decline and expect none. They believe that good crops

will stimulate sales the rest of the year. Some of them have experienced considerable difficulty in getting enough cars to meet the demand. Some distributors report that for the first time in two years they are sending carload shipments to their dealers in agricultural districts and that they expect brisk sales to begin next month in the farm sections.

Up to this time few sales have been made to farmers and the business in the smaller places is chiefly with professional men and merchants who are collecting some of the money on their books and investing it in low and medium priced cars. The sale of parts and accessories is brisk and dealers who handle them are "asking 'em to buy." No large stocks of accessories are carried, however.

THE rail strike has hit dealers in the South harder than in almost any other section and few of them have more than one or two cars on hand. Several dealers for a factory which has brought out a new line have not yet received demonstration cars and all they can do is to take orders. The factories are so far away that driveaways are impractical.

Southern railroads have been nearer collapse than those in the east, north and middle west and some of them have handled practically no freight. All the available rolling stock in the Birmingham district has been confined closely to the movement of coal from the non-union mines in that territory and there has been nothing left for other kinds of freight except foodstuffs. If the freight congestion continues it will result, inevitably, in a falling off in sales, for if dealers can't get goods they can't sell them.

There has been a big reorganization of the dealers' corps in the South in the last two years and the mortality has been heavy. Hundreds of the weaker ones financially and in a business way have fallen by the wayside. Most of those who have survived are on a fairly substantial basis but a good many of them have much to learn about merchandising methods.

Factories can well afford to spend considerable time, thought and money in building up dealer organizations in the South in preparation for the period of prosperity.

American Manufacturers Dominate Chinese Automotive Market

THE United States is easily first in the trade of China of the past six months, and there is no question whatsoever that for the time being American cars completely dominate the Shanghai market. The factor of price is one of the chief reasons for this, according to the *London Times*.

"Price is not the only factor. Chinese show a decided preference for American cars. They like the style of the American car. They like its clear cut body as opposed to the more massive body of the British car. The American car suits them also better than the British car as regards gear and lighting. In Shanghai there is no necessity for high-g geared cars. What is wanted is a car that will pick up quickly on "top" gear. As regards lighting, the post-war cars which came to China from Great Britain were equipped with electric lighting and starting as an afterthought, and lighting was belt-driven. As there are no long runs in Shanghai, it was impossible to keep the accumulators charged with the English dynamos, and consequently they got a bad name among the Chinese. Further, the starting batteries on English cars are considered poor compared with the American type. Again, the

majority of British cars are equipped with the modern artillery type of wheel, while the Chinese prefer wire wheels.

"The Americans are also very proficient in the packing of cars and contrive to reduce packing space to a minimum. American manufacturers, too, back their agents. When American manufacturers cut their prices after the war they gave their agents a certain time in which to sell their stocks. If unable to do so, the manufacturer gave a rebate in the nature of a credit. The British manufacturer, on the other hand, left his agent to do what he could with high priced cars.

"All these factors have combined to put the American car in the forefront in the Shanghai market. Americans, in fact, do not fear the competition of British cars, but of German, French, and Italian cars, all of which are as much as 50 per cent below the cost of cars of British make. Of German cars there are already six makes on the market—the Adler, Opel, Mercedes, Dixi, Benz and Austro-Daimler. One is sorry to have to state these facts, but they are facts, and it is for British manufacturers to consider whether there is any way of getting away from them."

New Vauxhall Four Has Lanchester Harmonic Balancer

British passenger car engine with overhead valves is designed to compete with six-cylinder jobs in smooth running qualities. It develops much higher power than engines of same make and displacement fitted with an L head and valves of larger diameter.

By M. W. Bourdon

EXCEPT for one year prior to the war the Vauxhall Motor Co. has always specialized in high grade four-cylinder cars, and this policy is continued in the recent introduction of a new model. The latter is termed 23-60 hp., has overhead valves, and supersedes the 25-hp. side valve type with the same bore and stroke. To provide the smooth-running qualities of a six-cylinder engine, and render it equal to the latter in all except continuity of torque, the Lanchester harmonic balancer has been adopted, this being the first standardized production to embody the refinement.

Other features of the engine include the camshaft design, referred to later, and the use of duralumin tubing for the push-rods. The latter material, in conjunction with the cylinder design and valve gear arrangement, insures the maintenance of valve clearance settings irrespective of engine temperature. As a result of the foregoing and other more conventional features of design and manufacture the new engine is certainly one of the quietest—if not actually the quietest—of overhead valve engines the writer has known.

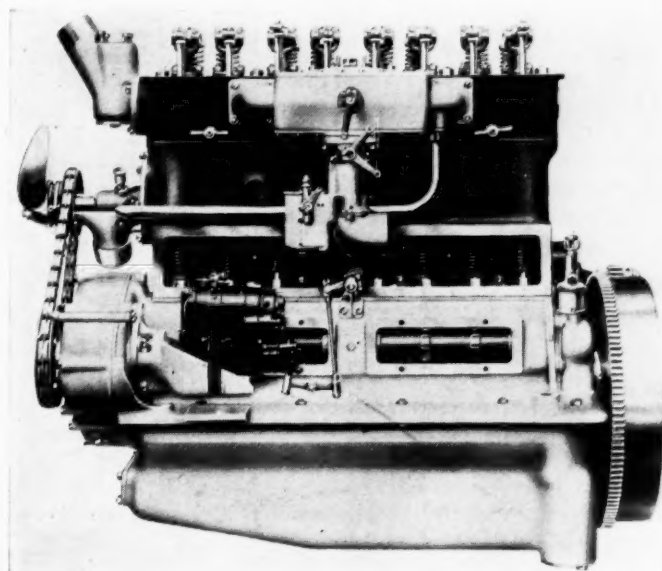
The Lanchester Balancer

Underlying the adoption of the Lanchester balancer is the idea that the majority of users of high grade cars, and more especially those who have closed bodywork, buy six-cylinder chassis not so much because of the better torque of the six, but because of the inherently imperfect balance of the four. The torque of the latter is good enough for all practical purposes, it is considered, but normally the four gives rise to a vibration, increasing in magnitude with the crankshaft speed, which may be, and often is, distinctly unpleasant in its direct effects upon the bodywork and in its reaction from the latter upon the passengers. The Lanchester device, it is claimed, damps out that vibration and enables a four-cylinder engine to meet requirements at considerably less cost and with other advantages as compared to the provision of two additional cylinders.

The balancer consists of a helical gear ring attached near to the center of the crankshaft and driving at twice crankshaft speed a small drum or cylinder with gear teeth cut at the center of its outer surface; this small geared cylinder meshes with a duplicate alongside and both are suspended below the crankshaft center line by a bracket attached to the bolts of the center bearing of the shaft. The geared cylinders run on plain white metal bearings with pressure lubrication and each has six holes drilled

from end to end equally spaced around its axis. Three of these holes are filled with lead, the required amount of the latter being determined for the individual engine when the weight of the pistons and small end of the connecting rods is known. These intergeared and counterweighted cylinders are timed in relation to one another and to the crankshaft so that, while in any position they act against each other by rotating in opposite directions, they also in combination set up a force which counteracts and cancels the vertically acting force arising from the differing angularity of the pairs of connecting rods and the resultant divergence in piston speeds.

To avoid the necessity for a large flange integral with the shaft the inner web of one of the central pair of cranks is slotted on its upper and lower faces and at one end; the separate flange is roughly of horse-shoe shape with a pilot shoulder to receive the gear ring, its jaw being dimensioned so as to slide into the web groove until it beds home with its outer surface concentric with the crankshaft axis. The gear ring is threaded over the shaft and bolted to the flange extension and it then registers the position of the flange and of itself by the inner surface of its hub making contact with the ungrooved end of the crank web, while the groove prevents axial movement of the two units.



Inlet side of new four-cylinder Vauxhall engine

Careful balancing of the crankshaft is obviously needed after the mounting of this gear ring and flange.

Engine Details

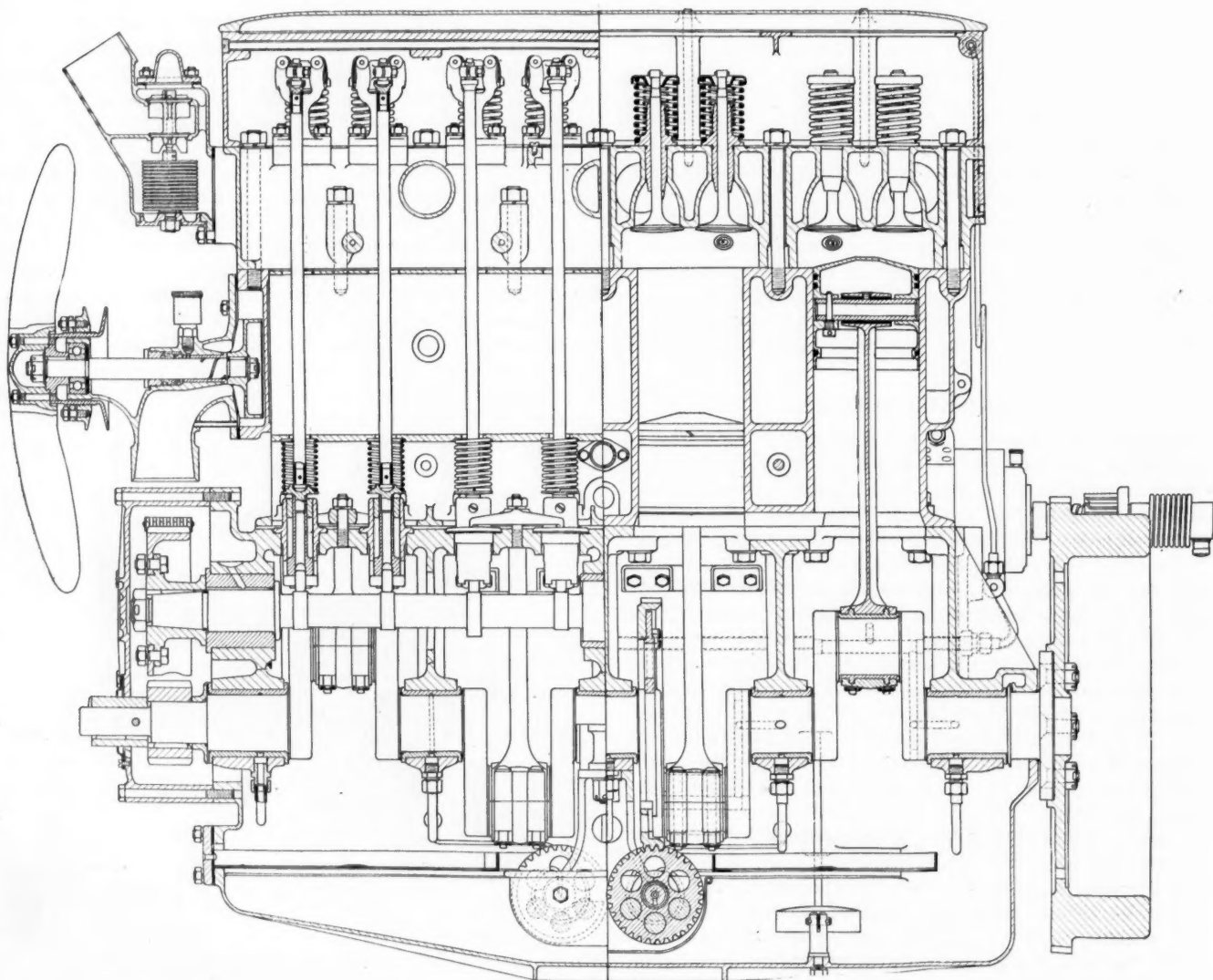
The engine has a bore and stroke of 95 x 140 mm. (approximately $3\frac{3}{4}$ x $5\frac{1}{2}$ in., or 242 cu. in. capacity). The block of cylinders is cast separate from the crankcase, the latter of aluminum and the former of cast iron. The detachable head, like the cylinder block, is extended on one side to enclose the push-rods, but there is no direct water joint between head and block, exterior water connections—flanged "dishes" of aluminum with an interior web—being used. The gasket, which is therefore needed only to hold cylinder pressure, is of aluminum, the faces of head and block being ground but not to anything approaching a glass-like finish.

Of the four exhaust passages, with outlet ports on the right of the cylinder head, the two at the center are also extended to the left side where they lead into an internally ribbed chamber at the center of the inlet manifold. In the neck of the connecting passage is a valve which enables the exhaust heat to be regulated or cut off entirely. There is no through outlet from the heating chamber; it is a cul-de-sac from which the pressure of the exhaust gas occurring during the valve opening periods is released over the heads of the valves while they are closed. This means of assisting vaporization is not intended for all-the-

year-round use, but constantly in service is a hot-water jacket on the inlet manifold. This jacket is coupled to the circulating system by pipes of unusually large bore for this purpose, viz., $\frac{5}{8}$ -in. internal diameter, and they are arranged in the circuit so that, when the thermostatic valve (which is fitted by Vauxhall for the first time in this new model) is closed, the water circulates through the manifold jacket; thus, in starting the engine from cold, heat for assisting vaporization is provided quickly even when the exhaust hot-spot valve is closed.

The standard carbureter, by the way, is of the Zenith triple venturi type, which has a rich mixture supply valve for starting. In addition, the Vauxhall Co. fits a hand-operated extra air-valve controlled by a third lever over the steering wheel.

The valves—two per cylinder—are vertical and in line-ahead in the center of the combustion chambers. They are of 2 in. overall diameter ($\frac{1}{4}$ in. less than the side valves of the superseded model), and of normal mushroom pattern. Each has two concentric springs with the seat secured by a split cone fixing. This arrangement of the valves necessitates the combustion chamber being oval, and it extends for approximately $\frac{9}{16}$ in. beyond the cylinder bore at front and back. The step which thus occurs may not be commendable from one standpoint, but it has an incidental merit in that in the somewhat unlikely event of a valve breaking near the end of the stem, the head



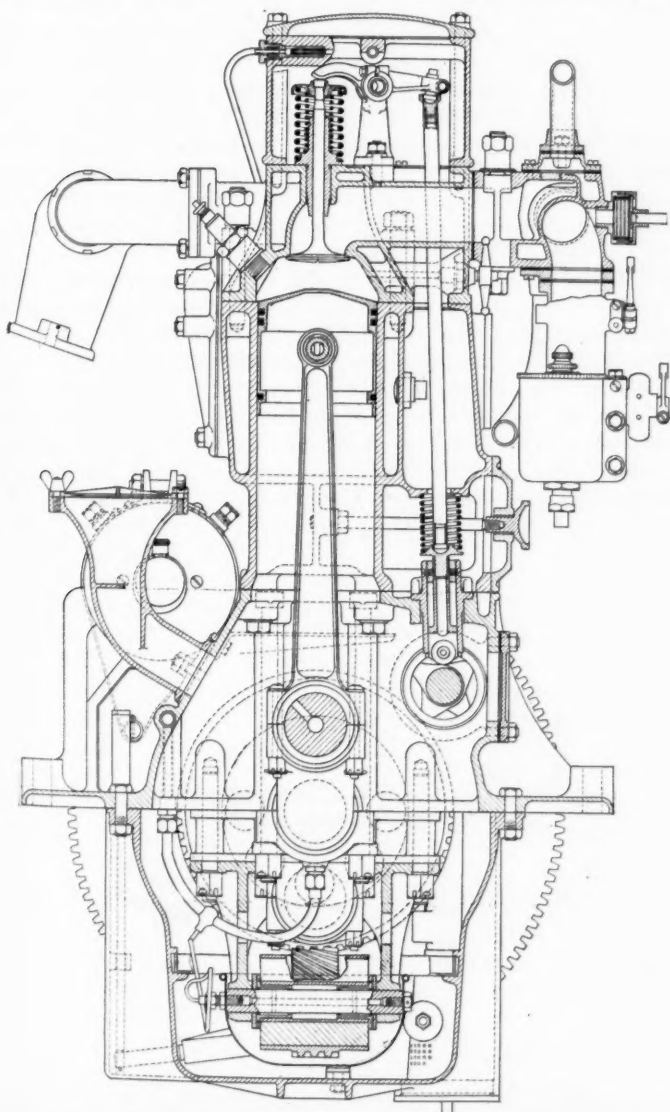
Lateral vertical sections of the new Vauxhall engine showing location and arrangement of the Lanchester harmonic balancing device

would find a resting place on the step and therefore no piston damage would result. While this departure from the approach to a hemispherical combustion chamber necessarily increases the exposed area, the fact that larger diameter valves can be used than would otherwise be the case probably compensates for the increased heat loss thus represented. In any event, the power curve is commendable, as mentioned hereafter, and, in comparison with the old L-head engine, the heat losses to the water jacket are shown by test to be approximately 40 per cent less.

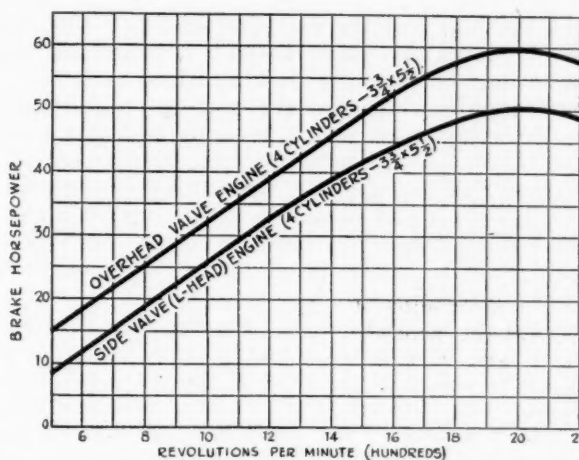
Valve Operation

Valve operation from the silent chain driven camshaft in the crankcase is through roller-ended followers of 5/16 in. diameter with separate and hardened cupped heads; each of the latter not only forms the lower abutment for the push-rod but also the bottom seating for a return spring which assists the valve springs proper in keeping follower and cam in contact. This third spring is also a factor in the quiet operation of the valve gear as will be seen later. It bears at its top end against a false bottom to the push-rod chamber formed in the cylinder block and is accessible through a handhole with an aluminum cover plate.

The push-rods of duralumin tubing of 7/16 in. diameter have hardened steel ends pinned to them. They bear upon rockers pivoted centrally on hollow spindles secured by pinch-bolts in the split forked ends of the rocker brackets.



Transverse section of the Vauxhall overhead valve engine



Comparative power-speed curves of the new Vauxhall overhead and the older side valve engine of the same make and displacement

The inner ends of each pair of rockers are closer together than the outer ends; therefore, a continuous shaft for all of them cannot be used, and each has its own short spindle. Lubrication is effected by drip from a pipe secured overhead in the aluminum top cover and fed by pressure from the main oil system. Clearance adjustment is by means of hardened spherical-ended set-screws locked by pinch-bolts in the outer ends of the rockers.

A peculiar feature lies in the design of the exhaust manifold. Instead of being cast as usual in one piece with four flanges bolted up to the outlet ports in the cylinder head, it consists of three parts, two flanged elbow pipes for the end cylinders with gland couplings into each side of a central unit. The latter has an inner but integral Y-branch for the central pair of ports, so that, while the latter discharge directly into the exhaust pipe, the outer pair discharge around the outer surface of the Y-branch, the gases issuing into the main pipe through an annular space around the stem of the "Y." Two ideas underlie this arrangement. The gland joints allow for the expansion and contraction of the manifold as a whole in relation to the head casting, while the concentric discharge tends to prevent back pressure upon the exhaust of individual cylinders and even to set up a slight ejector effect at the terminations of successive exhaust periods.

Cam Design

The fundamental feature of the cam design is that the base circle of the cam is eccentric to the shaft axis instead of concentric, the extent of the eccentricity being approximately 1/16 in. Inlet and exhaust cams are identical and of the constant acceleration type with concave flanks. This form of cam has been in use by the Vauxhall company for some years on its side valve engines. It results in a very gradual—one might also say gentle—opening, a quick lift to the maximum, followed by a similarly quick closing until the valve is about to reach its seat but on to which it is gently lowered. A secondary result of this design—which appears to be particularly suitable for overhead valve engines—is that remarkably large valve rocker clearances can be used without noisy operation ensuing; the settings can in fact vary from 0.025 to 0.06 in. clearance without causing noise. Consequently the usual need for frequent and precise valve clearance adjustments does not arise and therefore one of the main criticisms of the owner-driver against overhead valves is removed.

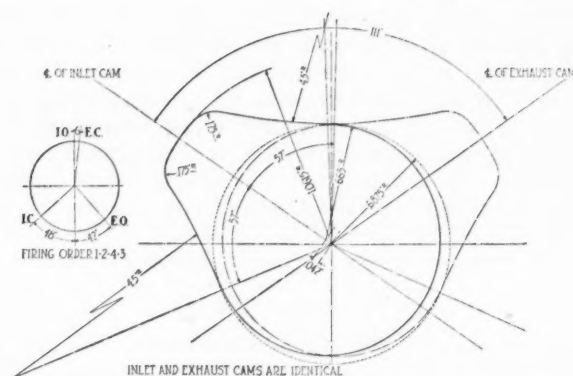
At first it might be thought that the cam design would detract from power development and that the advantage in this direction of the overhead valves would be lost or reduced. But the accompanying power curves showing the

b.h.p. of the new and the old (overhead and side valve) engines disproves this idea. In fact, it cannot be held as otherwise than an excellent showing when, as is the case, the new engine with standard settings of carbureter, valves and every other detail develops at 500 r.p.m. approximately 15 hp. as against $8\frac{1}{2}$ hp. in the case of the old one, and this too, with the same standard compression ratio of 4.25 to 1 and valves of $\frac{1}{4}$ in. smaller diameter. At high engine speeds—at 2000 r.p.m., for example—the new type shows a greater actual, though lower percentage, increase in developing 60 b.h.p. as against 50.

No doubt the somewhat surprising increase of power at 500 r.p.m. and thereabouts is due in some measure to the very large reduction in the area of the combustion chamber surface; for, of course, the factors of time and surface exposed to the heat of the explosion are then very important indeed. But it need hardly be said that alteration in valve position does not usually account for 76 per cent increase of power at any speed, high or low, and that no such increase is usually to be expected we have evidence in the comparative power curves which have been made available at one time and another by other makers. Possibly the reduction in inlet valve diameter in the case of the Vauxhall may partially account for the big increase, by having considerable effect in increasing the turbulence of the new charges at the lower part of the speed range—even though the benefit in this way may be ruled out at high speeds and the smaller valves actually cause a smaller percentage increase in power.

In view of the fact that this new engine with its Lan-ches-ter balancer sets out to compete with six-cylinder engines, it would surely be only natural for the makers to adopt a compromise such as that suggested in order to enhance the quality of acceleration by gaining as big an increase of power as possible at the lower speeds. Other makers desiring a high maximum power would select a different compromise to accord with their policy, fitting valves of as large a diameter as possible.

The hollow-crank system of lubrication is used in this engine, but unlike the usual practice in the majority of

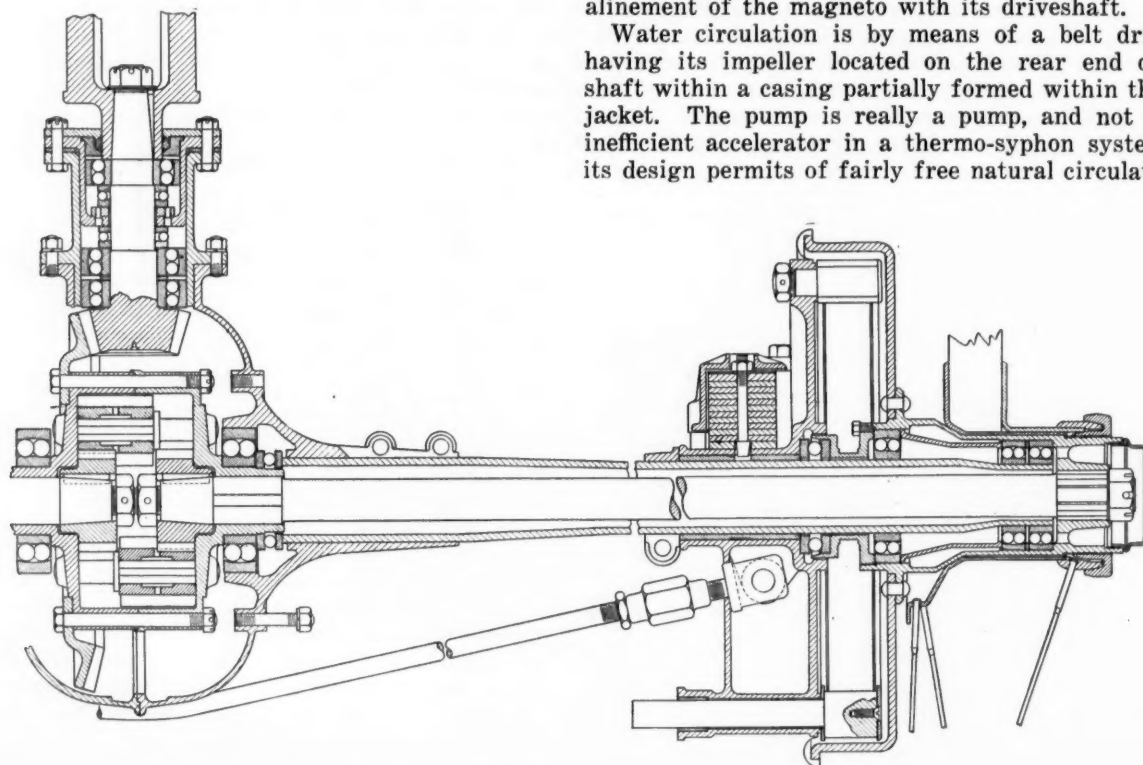


Type of inlet and exhaust cams used on new Vauxhall engine

British cars a plunger type pump is employed. It is driven by an eccentric pin at the rear end of the camshaft, a ball bearing being used for the coupling rod. Only one ball valve is provided, that at the inlet port at the bottom of the pump cylinder, the inertia of the column of oil discharged upward through a series of holes in the foot of the plunger and thence through an inlet hole in the cylinder below the plunger head into the pipe-line, serving to prevent the oil from being drawn back on the upward stroke. An upper extension of the eccentric strap operates the piston of the air pump for the pressure fed fuel tank.

Magneto ignition is used, and a special feature lies in the mounting of the magneto, for it is supported by an aluminum bracket integral with the rear cover plate of the side extension of the timing case. The combined cover plate and bracket serves also as the housing for the rear bearing of the shaft of the magneto drive sprocket, the bearing being eccentrically located. The combined front cover and bearing housing corresponds as regards eccentricity and is linked by an exterior bolt to the rear cover. When the stud nuts locating the two covers are loosened the latter can be partially and simultaneously rotated in order to adjust the timing chain without affecting the alinement of the magneto with its driveshaft.

Water circulation is by means of a belt driven pump having its impeller located on the rear end of the fan shaft within a casing partially formed within the cylinder jacket. The pump is really a pump, and not merely an inefficient accelerator in a thermo-syphon system, though its design permits of fairly free natural circulation if the



Sectional view of the full-floating rear axle

driving rotor should be stationary. As already mentioned, thermostatic control is provided, the device being located in the water outlet from the cylindric block. The water circulates continuously through the induction manifold jacket whatever the position of the thermostat valve; the latter is set to be fully open at 180 deg. Fahr. Adjustment of the fan and pump belt is accomplished by the axial movement of the front flange of the driven pulley, the hub being threaded; to lock the flange it is pinched toward a threaded ring alongside by means of two studs and nuts. Vauxhall was the first maker to use a belt-driven pump, a practice since followed in modified form by many other British car and truck makers.

The crankshaft runs on five white-metal bearings; the diameter of journals and crank pins is 2 in., the end journals are 3 in. in length, the other three and the big-end bushes $2\frac{3}{16}$ in. long. The H-section connecting rods are $11\frac{7}{8}$ in. between centers which, with the piston stroke of $5\frac{1}{2}$ in., gives a ratio of 2.16 to 1 and enables the cast-iron straight-sided pistons to be comparatively short. They are but 90 mm. in length of sides in a 95 mm. bore. The pistons are domed, have two rings in the head and a scraper in the skirt and the hollow wrist pin is fixed in their bosses by a tapered set-screw.

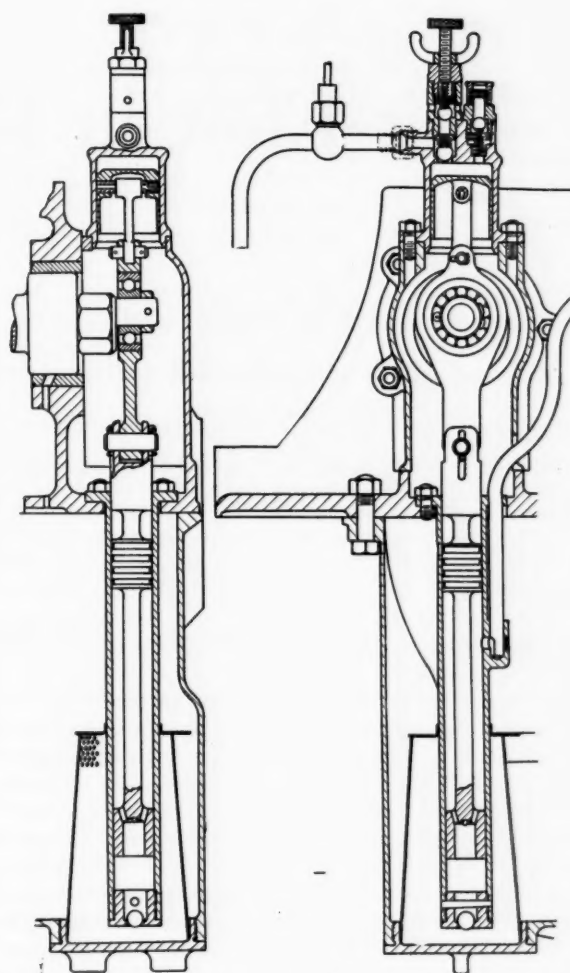
Gearset Details

Apart from the engine, this new model has no outstanding or novel features of design; in fact, it varies but slightly in transmission, brakes and suspension from the model it supersedes.

The clutch is of the multiple-disk pattern, unusual in that its alternate steel and bronze disks (13 driving and 12 driven of 9 in. and 8 in. overall diameter respectively) run dry without fabric facings. Powdered graphite in quite small quantities is made to serve as a lubricant. It is replenished every six months or so, and, as shown by experience with this same clutch in past years, it suffices to prevent the tearing of the metallic surfaces even when the clutch is slipped unduly. No adjustment is provided for the central enclosed spring.

Engine and four-speed gearset are mounted separately each at four points on a four-point suspended sub-frame. Between the units is one fabric disk joint. At all points excepting the pilot bearing the gear shafts run on ball journals. An internal shoe brake is fitted to the flange of the casing of the front universal joint of the open propeller shaft, this joint being of the cross-pin type, while the rear joint is of the pot or sliding block pattern.

Helical bevels are used for the final drive, the integral shaft of the bevel pinion having an exceptional support due to the use of three double-row ball journals in addition to ball thrusts. Double-row ball bearings are also used



Piston type oil and air pressure pumps fitted to Vauxhall engine

for the differential and road wheels, the latter having two of these at the outer ends and one inside, as well as being provided with a single row ball thrust.

The rear axle is of the full floating type with a cast steel center, weldless tubular extensions and a truss-rod below. The rear brakes are of the expanding pattern with drums of 16 in. internal diameter and friction surfaces 2 in. wide. Both wood and triple spoked wire wheels are standardized. The suspension is by half elliptic springs fore and aft, but these do not take torque, there being a separate pressed steel torque member.

The wheelbase is 129 in. and the track 56 in. The bare chassis weighs 2900 lb. and it is priced at £1,150.

British Possessions Take Large Car Shipments

THE most notable increase in passenger car shipments during July took place in British India, where in place of the average monthly shipments of 80 cars during the past months, 309 were imported during July valued at \$130,062. This increased demand is partly due to the increased Indian import tariff which is more detrimental to high-priced European cars than to the lower-priced cars of Canadian and American factories.

New Zealand imported 380 passenger cars from Canada during July as compared with 169 in June, and Australia

took 824 against 805. The United Kingdom imports of passenger cars from Canada increased from 368 during June, to 512 in July, while South Africa maintained its quota of the previous month with 266 passenger cars. Argentina imported 74 as compared with 34.

Australia was again the largest importer of automotive products from Canada, having taken 112 motor trucks and \$61,240 worth of parts as well as the largest number of passenger cars. New Zealand with 42 trucks reached second place in truck shipments.

Air Flow in Relation to Water Cooling

Radiator design is well advanced, but factors which control effectiveness are either disregarded or not well understood. Much saving in weight and cost is possible by improving air flow conditions. Radiator types are compared. Baffles increase efficiency.

By A. Ludlow Clayden

IN a previous article the writer discussed some aspects of cooling, mainly from the viewpoint of water circulation. The problem there dealt with was the transfer of heat from the engine into the radiator; and it was shown that the overall efficiency of the whole cooling system was susceptible to wide variation due to water conditions alone. Variations at least as great are found in a study of air flow; and for automobile work, at least, it is far more difficult to provide best conditions for air than for water.

In this consideration the existence of the engine can be forgotten. Assume a radiator being supplied with heat at a certain rate. The problem is to apply air to the radiator so as to remove heat at the same rate. The rise in temperature of the air for removal of a stated amount of heat will, of course, vary directly with the mass of air; but the rate of transfer decreases as the difference in temperature; which means that the rate of transfer from radiator to air is greatest at the front or entering edge, and least at the back. This leads directly to the conclusion that the greater the total quantity of air which can be put through a radiator, the smaller is the size of the radiator necessary for a given heat dissipation.

Suppose air for cooling purposes is available at a pressure of one inch of water, which pressure is maintained by the speed of travel of either air or radiator. Then the mass of air that will flow through a given size of radiator depends upon the resistance of the radiator. Suppose, further, the conditions are such that the air is heated ten degrees during its passage. If, then, the radiator is doubled in depth from front to back, which could be done without sensibly increasing its resistance, we should get the same mass flow of air; but it would not be heated 20 degrees, because the back half of the radiator would be working on air averaging 10 degrees hotter than the front half. Consequently, from this viewpoint a large radiator of small depth will be lighter for a given heat dissipation than a smaller one of greater depth.

On the other hand, the head resistance is proportional

THIS is the second of a series of four articles on cooling. It should be the subject of careful study by all automotive designers who are not thoroughly conversant with the factors governing the effectiveness of various types of radiators.

The subject is one which has not, apparently, been well understood. Many cars and trucks could probably be fitted with smaller and less expensive radiators, without any sacrifice of cooling efficiency, if the radiator were better located and suitable air outlets allowed.

to the frontal area, and usually increases much less rapidly than the depth, so for conditions of minimum weight of radiator with a given air pressure and minimum absorption of power in propelling the radiator through the air a compromise is necessary.

The total quantity or mass of air which will pass through any given radiator is directly proportional to the velocity of movement of the radiator through the air only at extremely low speeds. It is easily possible, by wind tunnel experiments, to es-

tablish the air flow characteristics for any particular design of radiator; but there is no very direct relationship between the air flow-velocity curve and the rate of heat transfer, because in all radiators some of the air passes through unheated, and in many designs a large proportion of it does so.

Referring again to Lanchester's work, we find that he examined the case of honeycomb radiators assembled from round or square tubes with expanded ends, and deduced the best ratios of length of passage to diameter thereof for different air velocities. For some reason, probably the indeterminate nature of turbulence, the deductions he gave do not agree with recent results obtained in laboratory testing. The latter shows advantage in using a much greater length of air passage in proportion to bore, especially at high air speed. To quote an example, Lanchester concluded that a developed area of 1 sq. ft. per b.hp. of the engine would be necessary for high speed airplanes using honeycomb constructions of 180 mm. depth. On pursuit planes for the U. S. Army as little as 0.4 sq. ft. per hp. has been employed, using tubes 9 in. deep by $\frac{1}{4}$ in. bore, practically the same bore as considered by Lanchester.

Now, this is due to the effect of water turbulence as well as to air turbulence, so it is far from easy to apply any correction to former figures. The particular case is merely cited as showing the extreme difficulty of calculating radiator characteristics except from closely similar empirical data.

Still more striking, however, is the fact that by so altering the air passage that turbulence is provoked, a much higher rate of heat transfer is obtainable. The case seems to be analogous to the flow of liquids through orifices or through small pipes, but the experimental data thus far collected is not yet sufficient to be of much value. In the case of the honeycomb radiator, placing a number of small dents in the walls of the tubes composing the assembly has practically no measurable restricting action on low air flows, while it increases the rate of heat transfer very much.

Again, to cite a single example, a 4-in. depth of "baffled" core made of the dented tubes will dispose of practically the same amount of heat as a 6-in., or even deeper, core of smooth bore tubes; and it is only at air velocities sensibly above 70 m.p.h. that the resistance of the baffled tube core begins to mount disproportionately. At speeds up to 50 m.p.h. there is practically no difference in the total mass of air passed by a 4-in. baffled core and a 4-in. plain tube; but the former will dispose of at least 25 per cent more heat.

THE function of the baffles is so to disturb the air that the portion near the axis of the tube will not flow through unheated. It cannot be heated by conduction or by connection from the air which actually touches the metal of the radiator, because there is entirely too little time for any such action to take place, hence the desire in designing the baffles is so to direct the air that any imaginary particle will flow through along a wave course, bumping against first one point on the tube, being bounced off into the main stream, thrown against another point, and so on. It is obvious that with any system of baffling having this function as its object, a speed of air flow will exist at which cavitation behind the baffles will begin; from that

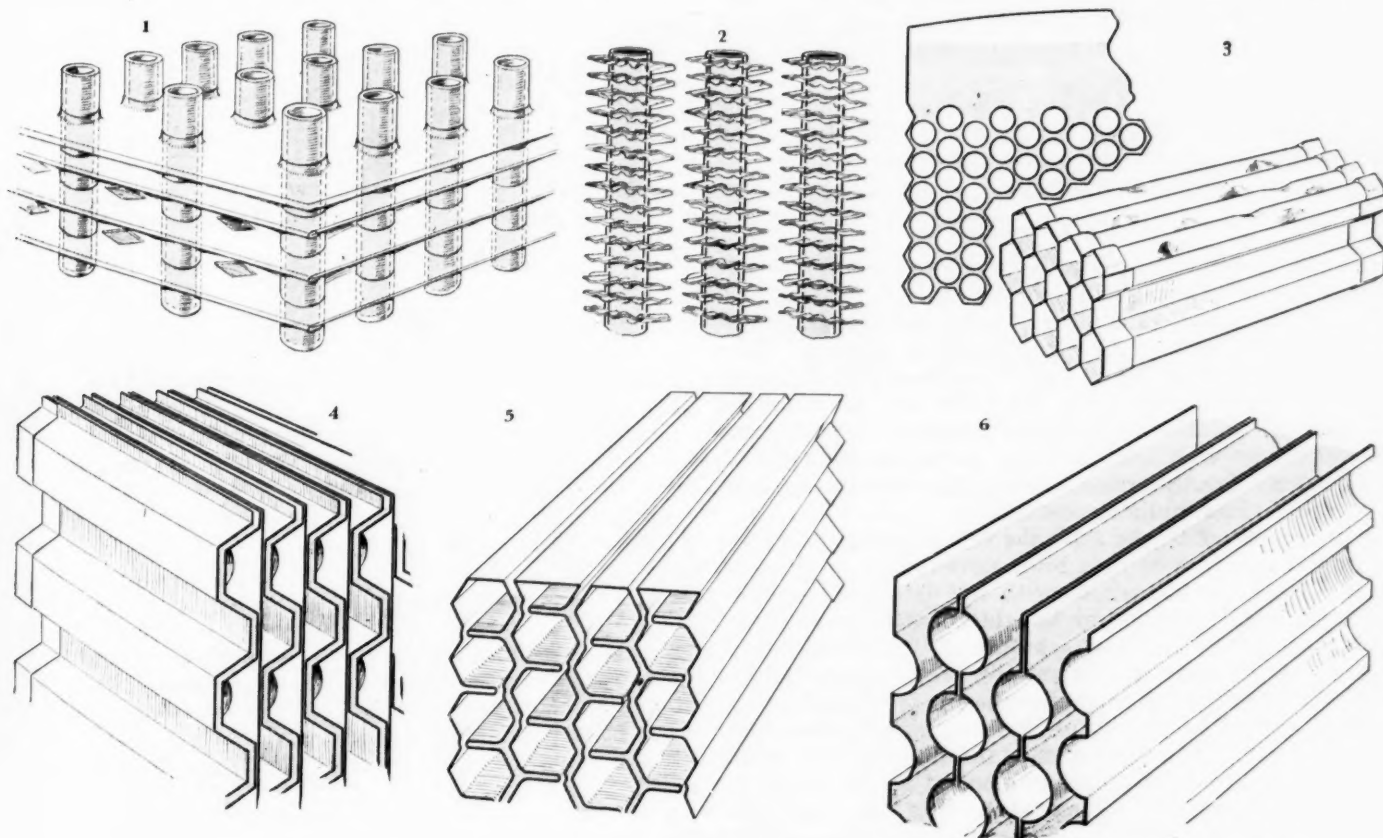
speed onward the resistance will commence to be serious and the rate of increase of heat transfer will drop.

It may be remarked that up to the present no system of baffling has been successfully applied to aircraft radiators, the air velocities being adequate, apparently, to insure turbulence, and the resistance caused by the baffles being enough to lower the figure of merit for the radiator. On the other hand, for automobile work baffling systems have proved highly advantageous.

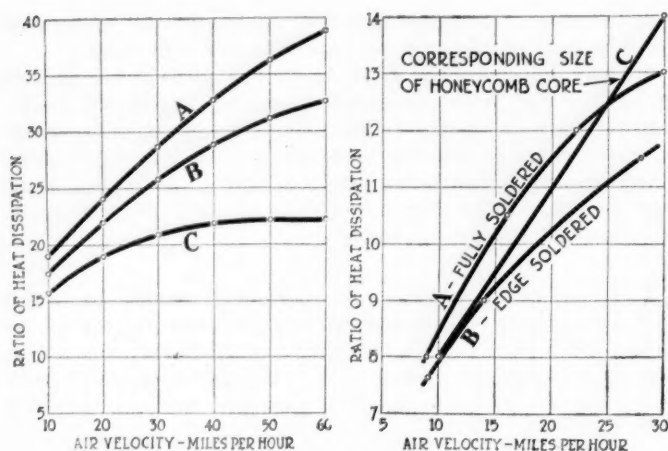
WHILE on the subject of baffling it should be added that the idea is comparatively new, the records of the patent office showing that it has received hardly any attention from inventors. As applied to tubular honeycomb radiators, the U. S. Cartridge Co. provides the only example with which the writer is acquainted; and in application to the ribbon type of core, the "air shredder" recently introduced by the Fedders Mfg. Co. is also the only case in the author's experience in which the provoking of air turbulence has been a deliberately sought feature.

There are three general types of radiator core in use. The earliest radiator used for automotive work consisted of a length of plain, coiled tube. In this the ratio of surface to volume was very low and the efficiency correspondingly poor. The natural idea was to provide closely spaced gills to increase the surface, and from this has grown up the most widely used form of automobile radiator, an assemblage of vertical tubes of small bore threaded through closely spaced plates of thin material known as the fin and tube type.

The second oldest type, probably, is the honeycomb made up of blocks of round or square tubes separated, so as to make water passages, either by expanding the ends of the tubes or by laying wires between them grid fashion. This is the type used most extensively for aircraft, and used



Illustrations of various types of radiator cores. Shaded portions indicate the water passages. 1 and 2 are examples of the finned tube core. 3 is a true cellular type made with horizontal expanded end tubes through which the air passes. Spaces between tubes is filled with water. 4, 5 and 6 are examples of various forms of the ribbon type core. Note the variation in direct and indirect cooling surface



At left, diagram showing the general form of curves for different characteristic forms of radiator. A. Core with all direct surface such as the true honeycomb and a few ribbon type designs. B. Core of good ribbon type with 50 per cent direct surface. C. Fin and tube core of average type. At right, relative efficiency of various types of core. Full soldering fin and tube core increases the efficiency considerably

to a great extent for European automobiles and to some extent in America.

The third type, ranking either equal to or a close second to the fin and tube type, according to the basis of comparison, for passenger cars is the ribbon radiator, in which cells are formed by bending very thin sheet metal. In this type the greatest variety of design exists, and also the greatest variations in efficiency.

It must be observed that in these constructions there are two types of surface used. Direct surface, meaning radiator surface exposed to water on one side and air on the other; and indirect surface, meaning surface exposed to air but only indirectly connected with water. The wall of the tube in a fin and tube radiator is direct surface, the fin indirect.

It follows that in the fin and tube type the bulk of the surface is indirect; in the honeycomb it is all direct, and in the ribbon type the proportion of direct and indirect may bear almost any relationship.

Heat Transfer

Now, it is axiomatic that direct surface is more efficient in heat transfer than indirect. All indirect surface partakes of the nature of a fin on a tube, heat being applied to the root of the fin and thence conducted outward. Since heat is being abstracted by the air continuously, it follows that the further away from the water any point on the fin may be, the lower will be its temperature. The rate of transfer of heat from radiator to air is, other things being equal, directly proportional to the difference in temperature between radiator and air.

In radiators of the fin and tube type the mean temperature of the fin portion is in proportion to that of the tube walls. It is highly variable with the details of the construction. It is affected by the thickness of the fins and by the security of their attachment to the tubes; for instance, the efficiency is substantially greater after the fins have been soldered to the tubes than it is when they are simply pressed on. Perhaps the most interesting characteristic of this type, however, is the rapidity with which it reaches a maximum of heat disposal as air speed increases. Considering a single tube provided with gills, it is obvious that the maximum amount of heat which any air velocity can remove from the gills is equal to the maximum amount that can flow into the gills from the

*Actually in proportion to the mass flow of air.

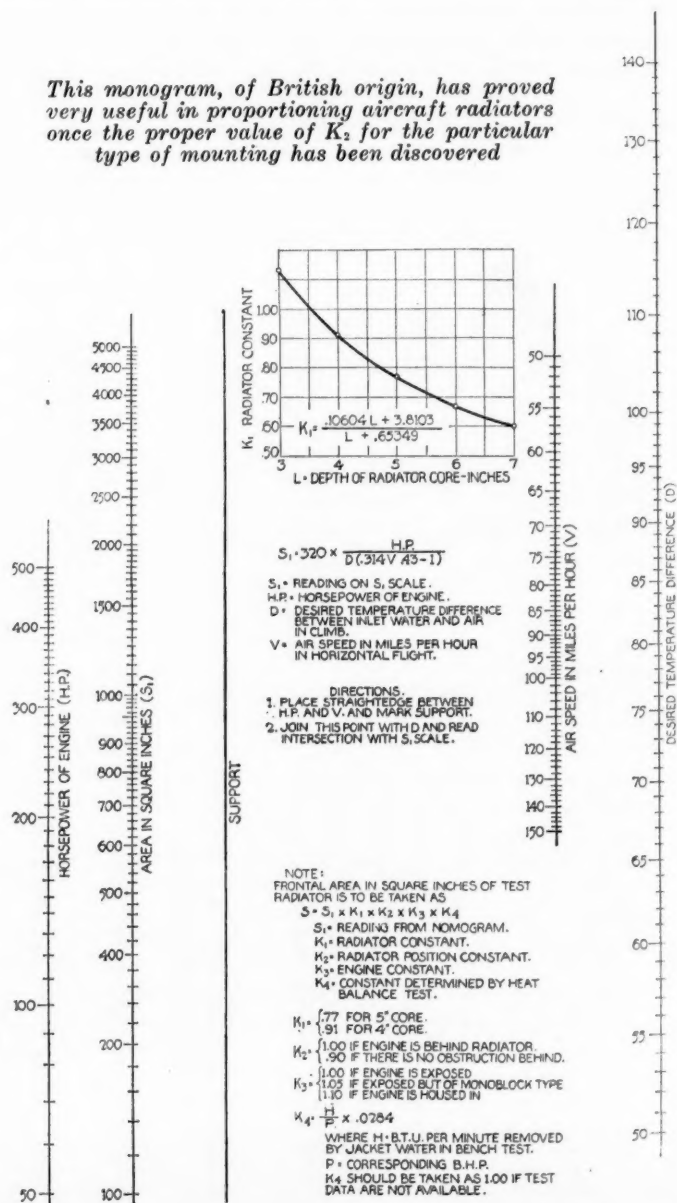
water tube. For gills of conventional thickness this maximum will be reached at a comparatively low air speed. When built with staggered tubes, which is probably the most efficient form, as it exposes a maximum of direct surface to the entering air, this type is usually characterized by a fairly high air resistance and considerable air turbulence. Consequently, its efficiency on a weight basis as compared with other types is greatest at low speeds, so rendering it peculiarly applicable to motor trucks.

Effects of Water Velocity

Effects of water velocity on this type are peculiar owing to violent turbulence occurring at critical velocities depending upon the bore and height of the tubes. The subject has never been fully investigated so far as the writer is aware, but in general the efficiency of this type is less susceptible to changes in water speed than types in which the water passage is much thinner.

The true honeycomb type, in which all surface is direct surface, possesses, at automobile speeds, an almost flat efficiency curve, the heat transfer being directly proportional to the air velocity, or nearly so.* Decrease in efficiency with increasing speed is due to rising resistance, which is partly offset by increasing turbulence. For aircraft work, the depth of core employed is usually between

This monogram, of British origin, has proved very useful in proportioning aircraft radiators once the proper value of K_2 for the particular type of mounting has been discovered



5 and 9 in., and for automobile and truck work from 2 to 4 in. The bore of tube used for aviation was fixed during the war at 7 mm., and remains substantially unchanged to-day. Owing to the expense of producing tubes of many different bores, experiment with this variable has been very slight.

It is probable that an equation connecting, bore, depth and air velocity could be discovered by adequate experiment; but varying the size and number of baffles probably has much the same effect as varying the bore. That is to say, the heat capable of being transferred by a 4-in. deep plain tube element in an air velocity of thirty m.p.h. when the tube is $\frac{1}{4}$ -in. bore may be x B.t.u. per second, and of a similar but baffled tube, $x + y$. Probably if the same amount of material could be made up into more than one tube of a smaller bore, we could discover a caliber which would give the same $x + y$ with plain tubes.

THE third type of core made from ribbon is in some instances so constructed that all its surface is direct, but usually half or more is indirect. However, the efficiency of the indirect portion is commonly fairly high. In this form the principal element almost always consists of a tube made by joining at the edges two strips of brass ribbon. The thickness of the water passage is commonly about 0.02 in. In some cases tubes of this sort are arranged parallel and vertical, their interspaces being $\frac{1}{4}$ to 5-16 in. wide and containing strips of ribbon bent zig-zag. The whole assembly being clamped together and dipped in solder provides a construction about 33 per cent direct and 66 per cent indirect surface. In this case each zig-zag of the spacer is a fin attached to direct surface at each of its extremities, which means that the "tip" of the fin, so to speak, is only $\frac{1}{8}$ in or so away from the water. Such a construction thoroughly well soldered has a surface efficiency of heat transfer but little inferior to that of direct surface.

Most of the inventive ingenuity put into ribbon radiators has been directed toward facilitating the process of making them and of obtaining accurately sized cells of a variety of forms designed to please the eye. When of the best standard of workmanship, the efficiency is high, but considerable care is necessary in manufacture to insure maintenance of dimensions owing to the delicate nature of copper or brass strip 0.005 in. thick.

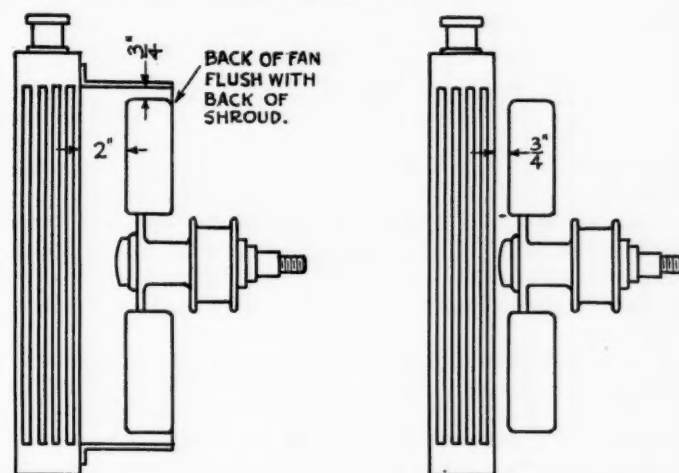
Efficiency of Ribbon Radiators

The efficiency of ribbon radiators with varying air speed depends upon the proportion of direct surface, as they may partake of the characteristics of either the fin and tube or of the honeycomb types. It is also considerably affected by the baffling, which is often accidental. In order to enable the machines to handle the ribbon, and also in order to stiffen it, it is necessary to introduce ribs, corrugations, or similar deformations from the original flat form. These are almost always bound to act as a drawback for aircraft work, except for slow speed ships; but they are of assistance for automobile work, provided they are not large enough to restrict air flow at operating speeds.

Mounting of radiators on aircraft is a large factor in their efficiency. An aviation radiator is chosen for its figure of merit, which is a factor derived from the weight of the radiator plus its water content, and from the resistance it offers. The higher the air speed the smaller the radiator necessary and the higher its resistance. Placed on the nose of the fuselage behind the propeller, the air velocity effective over the whole surface is roughly half that of the speed of flight, owing to the centrifugal action of the propeller. Placed on the side of the fuselage, in the slip stream, the available air velocity may be 1.25

times the mean speed of flight, for here the radiator obtains the benefit of the air leaving the tip of the propeller. It is obvious that other positions could be chosen such that the radiator would be subjected to precisely the speed of flight.

Present tendencies are favoring the slip stream position but for several reasons, not the least of which is that the small, deep radiator thus made possible is structurally very strong, and its small weight renders its secure support easy. Also this position, as already pointed out, facilitates the obtaining of high rates of water flow, the engine being well above the radiator. Finally there is nothing behind a radiator so placed, consequently the outlet for the heated air is perfectly free; shuttering is easy and streamline shuttering possible.



Recommendation of one fan manufacturer (the Oakes Co.) regarding (at left) the position of a large fan when a shroud is employed and (at right) when no shroud is employed and the fan is arranged either to blow or draw the air through the radiator

Mounting of radiators on automobiles is a very different matter, and from the point of view of cooling strictly it is much to be regretted that the front end of the hood ever became the conventional position.

Air in passing through a radiator is, of course, expanded, consequently it ought to be given a larger outlet than it has an intake. Actually there is hardly a car in existence in which any provision is made for the escape of air other than what accidental space exists under the sloping foot board and the louvres in the bonnet. With respect to the latter also, their size and placing is generally dictated by conventional ideas of looks rather than by any thermo-dynamic considerations.

BUT this, bad though it is, is hardly the worst of the absurdities found in motor car cooling systems. It may be remarked, however, that one of the principal reasons why Vee engines have the reputation of being hard to cool is the great extent to which an engine of this type fills up the space under the bonnet. It is particularly effective in choking the outlet under the toe board. When vertical engines are used and there are filling strips between the crankcase and the frame side members, louvres cut in these strips often are very valuable. Apparently, especially with a fan running, eddies can be set up which seriously damp air flow. It is a common experience to find when a car or truck is standing with the engine running, that air actually comes out through the edges of the radiator. Eddies can apparently be broken up by providing even quite small outlets at points which trial alone will discover and the addition of 10 per cent to the outlet available can make a difference twice as great in the effective air flow.

Mention of fans leads to the much discussed point of whether or not there is advantage in cowl a fan by a sheet metal cover joining the fan circle to the edges of the radiator. Usually the fan cannot be placed sufficiently far behind the radiator for the cowl to have much effect and, though this may not apply to trucks, there is the additional drawback for passenger car work that the fan at high speeds detracts from the natural draft.

Taking all in all, however, it appears to the writer that it should not surpass designers' ingenuity to provide better outlets for the air which, having passed through the radiator, has done its work. The reward obtainable would be a decrease in the weight and cost of the radiator. At

least a third smaller radiator would suffice if anything approaching free atmosphere were behind the radiator as in front of it. It is especially surprising that the lesson of slip stream radiators has not been observed by racing car builders, for, by mounting radiators on the side of the cowl and providing a streamlined nose, the resistance could without question be reduced quite sensibly.

The design of radiators appears to be in a fairly advanced state, for automobile work and probably a much less developed condition for aircraft. Conversely, in the application of radiators the state of the art is highly advanced in aircraft and very much the opposite in automobile practice.

How Much Should a Truck Be Taxed?

EVEN within the automotive industry there are some who do not believe in economic usefulness of the truck and the bus. Some people in the industry, and many outside of it, feel that the truck and bus are a menace to traffic and that they fail to pay taxes in proportion to the damage to roads and traffic which they inflict.

The case of the electric railways and the railroads is often cited, the point being made that these units have to pay for their right of way and that the truck and bus run over a right of way paid for almost entirely by public funds.

A closer analysis than these critics are wont to give shows certain fallacies in their argument.

In the first place, those who really visualize the future of the truck and bus firmly believe that these vehicles should justly be called upon to pay their way. At the present time they do pay heavy taxes in certain states and a considerable tax in every state. It is impossible for anyone to say whether or not a truck is paying a fair tax in any given case, because data is not yet available to determine accurately either the damage the truck does to the road and to traffic, or the economic benefit that it brings to the public as a transportation medium.

STUDIES are being carried on by various research agencies which will go far toward determining the relation between the various factors involved.

To say that the truck destroys certain highways is not sufficient cause to say that the truck is a menace. The horse could not operate efficiently on the cow path,

nor could the automobile operate efficiently on the roads constructed for only horse travel.

Enough data is already at hand to prove that under certain given conditions the truck is an efficient transportation medium; that is, it performs a service better than any other medium with a resulting benefit to the public as well as to the operator.

To build roads suitable for truck traffic may or may not cost more in actual outlay than to build roads suitable merely for car traffic. In any case, the actual outlay must be correlated with data showing the transportation saving to the community made by truck haulage before the actual net cost of the roads to the public can be determined.

AS regards the railways paying for their right of way, it may be pointed out that whatever expenses are incurred by the railroads must eventually be paid by those who ride on them or by those who ship freight on them. The use of railroads is widespread enough to make the statement true that in the end the right of way for which the railroads pay is paid by the public.

The question of bus and truck economy and efficiency from a public standpoint is a large one. It will not be entirely and satisfactorily answered for some years. The accumulation and analysis of considerable data is necessary before adequate conclusions can be reached. As noted before, however, enough has already been found out to determine the usefulness of the truck and bus under certain circumstances and to indicate a wide field of future usefulness for both of these new transportation mediums.

French Exports Increase

FRENCH automobile manufacturers have made considerable progress in their export business. The reports received from Vice-Consul Levis, at Bordeaux, show that the French passenger car exports for the first five months of the present year have increased considerably, with a total of 5295 having been exported at a total value of 263,979,000 francs. Thirty per cent of the above number were exported during the month of May. The rapid extension of the manufacture of low-priced cars with economical cost of operation has been responsible for the increase in

exports. Great Britain received 1895 of the passenger cars, Belgium took 1496, Switzerland 246, the United States 130, Germany 86, and Japan 62.

The French colonial possessions imported 919 cars from France during the five months and the remaining 463 were exported to other countries. Motor truck exports (including tractors) for the five months totaled 2496 valued at 135,590,000 francs, the leading markets for these exported trucks being England, with 1299, and, secondly, Belgium taking 426.

Protecting Wood Against Moisture by Suitable Coatings

For best results the moisture content of wood once dried should remain constant. The factors which cause expansion and contraction are here outlined, various protective coatings are compared and the need for moisture-proof coatings is emphasized.

By Cornelius T. Myers*

ABOUT two years ago the author, in carrying on some research work on wood wheels, had occasion to make inquiry among paint manufacturers as to the value of various kinds of paints and primers for the protection of wood against moisture. This inquiry brought out so many differences and variations in opinion as to paint materials and mixture proportions that a more extensive inquiry among paint men was started. It revealed that:

- (1) There was comparatively little technical information to be gained from the paint industry on the relative protective values of different coatings for wood
- (2) The paint industry did not generally recognize the moisture-proofing of wood as a problem, but was concentrating so far as the more reputable manufacturers were concerned on producing paints that would last as long as possible on the surface to which they were applied. In other words, such improvements as have been made have contributed to the life of the coating rather than the life and usefulness of the article which received the coat.

Wood is said to be oven-dry when continued oven drying causes no further loss of weight. In their green state the woods used structurally have a moisture content of 60 to 120 per cent of their oven-dry weight, and weigh roughly from 60 to 120 per cent more than when they are in an oven-dry state. In other words, 35 to 55 per cent of the weight of a green log is water. In the green log this water exists in two conditions:

- (1) Minute particles of water in each tiny wood cell cavity, known as "free water"
- (2) The moisture absorbed by the fibrous material which forms the walls of the cells, known as "hygroscopic moisture."

Felled wood exposed to average atmospheric conditions gradually dries, the air taking up its moisture. First the cell cavities slowly give up their moisture. The evaporation goes on until the cell cavities are emptied of the minute particles of "free water" they contain. All that remains is the moisture actually absorbed by the fibres of the cell walls, which are still saturated with the "hygroscopic moisture." Wood in this state is said to be at its "fibre-saturation point." Up to this time the wood does not appreciably change in size or in physical character-

istics except as to weight, which of course decreases considerably as it will now contain but 25 to 30 per cent of moisture instead of 60 to 120 per cent.

Further drying of the wood is necessary in order to increase its strength, hardness and durability to enable it to take and hold paint, and in general to improve its condition for the purpose intended. As this drying progresses beyond the fibre-saturation point, the cell walls give up the moisture they have absorbed, and in so doing they shrink and harden. Under natural conditions this drying process will continue until the amount of moisture in the wood bears a quite definite relation to the average humidity condition in the particular locality. In the eastern and north central states, for instance, the moisture content of wood will become stabilized somewhere in the neighborhood of 14 per cent for what is known as thoroughly air-dried stock. Of course unpainted wood that is exposed to rain and snow will absorb considerably more than 14 per cent, depending upon the dimensions of the piece and the extent of the exposure.

Forest Products Laboratory Data

Data secured from the Forest Products Laboratory of the United States Department of Agriculture show that

- (1) Many woods should be dried to about 8 per cent moisture content to give the best results as to strength, durability, hardness and finish (See Table 1)
- (2) It is also true that if after being dried, and shrinking in the process, wood reabsorbs moisture, it will swell again according to the amount absorbed
- (3) The shrinking and swelling along the grain, perpendicular to the grain and tangential to the grain all differ, and very materially, for a given change in moisture content. (See Table 2.)

From the two following tables it will be seen that it is quite desirable to have wood thoroughly dried, and that steps should be taken to keep it so. But although it is easy to reduce the moisture to 8 per cent in dry kilns, it is difficult to maintain the wood at this point; because of unsuitable protective coatings, or processes, and because of the lack of knowledge as to relative ability of various coatings to stabilize moisture content within a small range.

While we know that several coats of good paint may give adequate protection for floors, truck bodies, wheels or other wooden parts, we by no means know what paints give the best protection or what paints will give fairly

*Condensed from a paper in *Mechanical Engineering*, Aug. 1922.

TABLE 1. APPROXIMATE PERCENTAGE OF INCREASE IN STRENGTH OVER GREEN¹

	Dried to 14 Per Cent Moisture	Dried to 8 Per Cent Moisture
Bending strength, modulus of rupture...	40 to 60	80 to 100
Compression parallel to grain.....	80 to 90	100 to 150
Compression perpendicular to grain....	65 to 75	
Stiffness, modulus of elasticity.....	20 to 30	25 to 35 ²
Hardness	30 to 35	40 to 50 ²
Shearing strength, parallel to grain....	40 to 50	60 to 70 ²

¹ Compiled from data given in Timber, Its Strength, Seasoning and Grading, by H. S. Betts. ² Estimated.

TABLE 2. SHRINKAGE AND MOISTURE CONTENT OF HARDWOOD¹

	Specific Gravity of Dry Wood	Shrinkage ² in Per Cent of Green from Green to Oven-Dry		Green Moist in Per Cent of Dry Wood Wt.
		Radial	Tangential	
Ash, white ⁴	0.57	4.8	7.0	39
Birch, yellow ³	0.55	7.4	8.9	68
Elm, cork	0.57	4.8	8.1	53
Hickory ⁴	0.64	7.2	10.9	60
Maple ⁵	0.51	4.2	8.5	63
Oak, red ⁵	0.56	3.9	8.3	83
Oak, white ⁵	0.60	5.3	8.8	66
Average	0.57	5.4	8.6	62

¹ Compiled from data given in Kiln Drying of Lumber, by H. D. Tiemann. ² Average shrinkage along the grain, up and down as the tree grows, is only about 1/2 per cent. ³ Average of 2 species. ⁴ Average of 9 species. ⁵ Average of 3 species.

satisfactory protection for the least money. The test fences, where many different paints were exposed to the same atmospheric conditions, have given some data on the durability of paints, but very little data on the durability of the painted article or its dimensional stability. *In durability and dimensional stabilization we are greatly interested*; in the first for very obvious reasons, in the second because wooden structures are more durable, serviceable, and can be made more simply if their various component parts do not expand and contract with changing weather conditions. The cost of drying could be reduced in many cases, if when dried to a certain point the moisture content could be stabilized. Wood, on account of its very valuable characteristics, could be used in places where metal now seems necessary. A dozen or more prominent concerns in the paint industry have been co-operating commendably in research work, realizing that the dimensional stabilization of wood by moisture-proofing is a proper function of paint and of world-wide importance. There is, however, quite a difference of opinion among these manufacturers as to what materials should be used, and how they should be mixed and applied. During the war the Forest Products Laboratory investigated the moisture-proofing effects of linseed oil and various paints, varnishes and leaf-metal coatings as applied to airplane-propellers and other airplane parts made of wood, but this work has not been broadened because of lack of funds.

IN order to get some comparative data on the paints and primers now on the market, tests have been made on small hickory, oak, birch and maple by paint concerns.

In general, the results of the tests showed that paints of the ordinary brands and formulas were not very effective as moisture-proofing agents, even when three coats were applied. One paint concern after testing its standard brands did a little experimenting, and without much difficulty was able to produce a special primer that was several times as effective. There was great variation in effectiveness of paints used. Averaging the results for hickory, oak, maple and birch, it took about six times as long for these test pieces to absorb an extra 6 per cent of moisture when coated with the "special" as when coated with the standard "A." There is every reason to believe that much better results can be secured and with less than three coats. Preliminary tests with a casein solution indicate that it has water-proofing qualities, which, for some classes of protection, may be very valuable. The same is true of some of the pyroxalin com-

pounds. Varnishes are in general more effective than paints, but in the protection of wheels their application was unsuitable for primary coats.

Flooring, decking, paneling, etc., would be greatly benefited if it did not "work." Many wooden structures would be simpler and more permanent if so protected, and with thoroughly dried timber they would either have a greater factor of safety or could be built with less lumber. Many other advantages will develop as thought is given to the dimensional stabilization of wood by rendering it moisture-proof to some substantial degree.

It is well known that shingles and weather boards fastened with old-fashioned wrought-iron nails stay tight much longer than those in which the modern steel nail is used. The reason for this is that the steel nail rusts and is flaked off by the movement, or "working," of the piece through which it is driven. A nail tightly driven is practically sealed against external moisture by its head and the paint around it; but if moisture reaches the nail by the capillary action of the wood fibers, it will rust in spite of end sealing. Then too the moisture and capillarity of the wood cause the "working" that rubs off the layer of rust and exposes the nail to continuous corrosion. The working also abrades the wood and leaves the familiar large, rust-stained hole around an attenuated nail. The same conditions apply to the bolts and other steel fastenings in farm machinery, wagons, motor-truck bodies, and a long list of other articles. It is of vast importance in wood construction, therefore, that we have paints to protect the wood from absorbing moisture. Ordinary paint does not effectively do this except when a large number of coats is applied, and so far as the writer has been able to find out, there has been little or no attempt to produce a paint that will do it. There seems to be a great possibility for economies, either by the use of cheaper paints which give protection, or paints which will last longer.

Need for Research

Paint literature of a technical nature is quite inadequate to explain the why and wherefore of much present practice. Great differences of opinion and some vague reasoning appear. Many contentions seem to be based on a desire to use certain materials or formulas, rather than on comparative service data of a reliable sort. Such men as Dr. Sabin of the National Lead Co., and Dr. Holly of Acme White Lead and Color Works, made frank acknowledgment of the shortcomings of paint technology and totally disavow any detail information concerning the effect of paints on moisture-proofing the cell structure of woods of various kinds. The Engineering Foundation has approved the desirability of research on this subject and has appointed a committee to report ways and means of furthering it. This is a most substantial endorsement. The Society of Automotive Engineers and the American Institute of Architects have also approved and will lend their support.

The Forest Products Laboratory is by all odds our most authoritative source of information on woods and their structure. The director and his staff have been interviewed and fully agree that this research would be productive of important results, some of which could be expected in the course of 8 to 12 months; also that it can be handled there if funds in a very modest amount, between \$10,000 and \$20,000 per year, were made available for, say, from five to ten years. The Bureau of Standards has a paint division and has funds to work on the paint end of the research. Doubtless a co-operative arrangement could be made between these two of the most capable and helpful arms of our governmental service.

There is a crying need for such information, and inside of a year after the work is started a considerable amount of usable data should be forthcoming.

Advantages and Limitations of Cold Drawn Steel in Automotive Work

Cold drawn work produces excellent finish and the operations are for the most part simple and fool-proof. Necessity for high ductility, however, limits such work to softer grades of material. Other phases of this problem are illuminated by research.

By Dr. Walter Rosenhain

BOTH ferrous and non-ferrous materials are frequently supplied and used in a cold-worked condition, while cold working is sometimes used in the final shaping of various articles, such as cold pressings or stampings, or even in simple cold bending. It cannot be denied that such processes and the articles produced by them offer certain very attractive advantages. From the pure production point of view they are excellent in many ways—for reasons which we shall consider in detail.

This very attractiveness, however, makes it all the more important to consider the real nature of the processes and their products and to ascertain whether there are any limitations or objections to their use. As we shall see, such objections and limitations do exist and it is eminently advisable for the automotive engineer to consider them carefully before deciding to utilize cold-worked material in his construction.

However attractive a process of production may be, it cannot in the end fail to defeat its own object if the quality of the product is not adequate for the purpose for which it is desired. There are many purposes where the use of cold-worked materials or products is entirely satisfactory, while in other cases their introduction is a matter of doubtful wisdom.

Taking first the advantages of "cold work," it is obvious that the first and foremost of them may be expressed in the one word, "finish." Cold-drawn steel rod, for example, can be produced with a smooth and if desired a bright finish such as is not attainable by any process of hot working. Similarly, stampings and pressings can be produced with an excellent surface finish and of very great accuracy of shape and dimensions. The use of furnaces for heating the metal is entirely eliminated and with it the damage to the surface of the metal by oxidation or scaling. It is true that more power is required to bring about a given change of shape in the cold than when heat is applied, but power is relatively cheap and the cost of heavier plant for its application balances against the first cost and comparatively high upkeep expenses of furnaces. Further, cold-working operations of all kinds are very simple and almost fool-proof. Once the plant has been correctly designed and installed, very little expert supervision is required and many operations can be rendered automatic—all obvious advantages from the point of view of mass production. Finally, cold-worked material is often stiffer and appears to be stronger than the same material in the annealed condition and this apparent increase of strength is sometimes looked upon as a material gain.

With these great and obvious advantages of cold-working fully in our minds, we may now turn to consider the limitations of the process. The first of these is self-evident. Since the metal has to undergo a serious amount of deformation in the cold, it is clear that it must possess a large degree of ductility in the first place, and this limits the applicability of cold-working processes to the softest grades of material.

In the case of steel it is rare to find cold working, except in the special case of wire-drawing, applied to materials with a carbon-content higher than 0.2 per cent unless very gradual deformations are used in conjunction with repeated annealings. Such a limitation in the choice of materials for various purposes is a serious matter. It is true that the high ductility of soft metals is, from certain points of view, an advantage, but it is coming to be realized that this advantage is often purchased at too high a price. For very many purposes it is resistance to fatigue or alternating stresses, such as those arising from vibration, which is vital, and this power of resistance is undoubtedly a function of the real elastic range of the metal.

Soft Metals

Very soft metals always have a short elastic range and, correspondingly a low resistance to fatigue. There is only one real exception to this principle; it arises where a piece of metal is exposed not to a definite range of alternating stress but to a definite degree of alternating deformation of fairly considerable range. In such a case, however high the real elastic range of a harder material may be, that range may be definitely exceeded at every deformation and in that case failure may be much more rapid in the hard than in the soft metal, although—ultimately—failure will result in both, but the life of the soft material may be long enough to be useful in practice.

Apart from these very special cases, the use of the soft metals which lend themselves to cold working undoubtedly constitutes a sacrifice on the part of the designer. As against this it is sometimes suggested that the very process of cold working serves to harden and stiffen the material so much that in the cold-worked state it is as strong as a harder material in the normal or annealed condition.

If we confine our attention to the results of tensile tests this is undoubtedly true in those cases where the cold work has been applied in a thorough and fairly uniform manner to the whole mass of metal in question, as—for instance—in a well-drawn rod or tube. Both the ultimate tensile strength and the "static" elastic limit and the yield-point



Fig. 1—Typical structure of nearly pure iron (very low carbon steel) in annealed condition.



Fig. 2—Same material of Fig. 1 after slight cold-working.

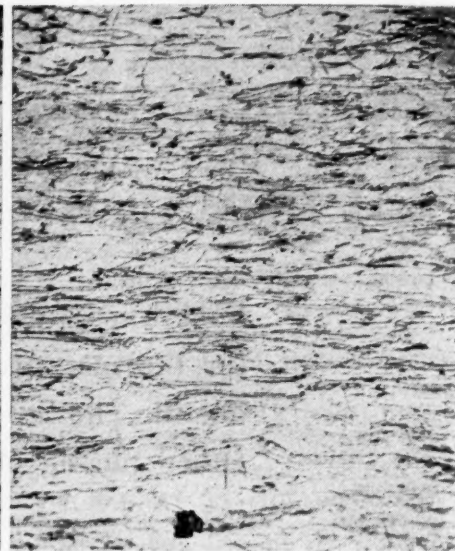


Fig. 3—Same material after more severe cold-working

are considerably raised while the elongation and reduction of area are correspondingly reduced. But if we look further we find that, in reality, the true nature of the metal has not been very much altered. Its real elastic range is displaced rather than truly enlarged. The bulk of the experimental evidence appears to show quite clearly that the extra hardness obtained by cold work does not materially increase the range of fatigue resistance of a metal.

The only contrary evidence hitherto produced is based on a few experiments made by Hatfield on cold-drawn brass, but even if these should be confirmed by subsequent workers it does not appear that the results apply to steel; there the work of Bauschinger, Bairstow and many others is quite conclusive in showing that from the fatigue point of view the added strength due to cold work is illusory, although the loss of ductility is entirely real and permanent.

Effects on Micro-Structure

To appreciate better what it is that happens to a metal when it is subjected to cold working it is desirable to consider the effects produced upon its micro-structure. It is true that, directly, the micro-structure is of no particular interest to the engineer who uses a material, but since it serves to explain the properties which the metal displays in manufacture and use, an understanding of this internal structure is none the less worth while.

Let us take as our example a "simple" metal consisting only of crystals of one kind, such as approximately pure iron. In practice, a very mild steel, such as that frequently used for cold pressing, shows a very similar micro-structure except that here and there we find a few small crystals of a second, harder, constituent. This simple micro-structure is illustrated in Fig. 1, which represents the typical structure of a piece of "Armco" iron in the fully-annealed state. It is an aggregate of crystals, varying in size and shape but approximately of equal dimensions in all directions. The photograph shows no direction of predominating length.

If we examine the same material after it has been extended by cold work by about 20 per cent, it shows the structure seen in Fig. 2, where the constituent crystals are still seen well defined, but markedly elongated in the direction of extension.

If we carry the cold working process still further, the structure becomes rather less easily intelligible, because

the individual crystals are so much elongated that they assume the appearance of a bundle of fine fibres, Fig. 3.

If, instead of nearly pure iron, we take a piece of mild steel, containing about 0.15 per cent of carbon, we find a corresponding series of structures, except that we see two constituents which, originally arranged in a more or less uniform manner, become drawn out into the semblance of fine parallel fibres (See Figs. 4, 5 and 6).

Left in this condition, the metal is in the apparently strengthened and hardened state, but this arises rather from loss of its ductility than from real increase in strength. On annealing, the elongated crystals disappear and are replaced by a new growth of approximately symmetrical or "equi-axed" crystals which begin their growth mainly from the boundaries of the old drawn-out crystals and soon replace them entirely. When thus annealed and re-crystallized, the metal returns more or less completely to its initial condition, but by varying the rate of cooling and the temperature and time of annealing, a finer grain can be obtained than is usually present in the material as delivered by steel makers unless specially "normalized" steel has been specified.

The photographs Figs. 1 to 3 and 4 to 6 represent the whole of the structure characteristic of a piece of iron or mild steel which has received a uniform amount of cold work throughout. This can, of course, at best occur only where there has been uniform extension or compression throughout the piece, as in a carefully cold-drawn rod or wire.

Bending

Where bending has been used, a different state of affairs arises and the degree of cold-work varies from point to point in the piece so that micro-structures corresponding to Figs. 1 to 3 or 4 to 6 are found in different portions of the same piece. It will be clear at once that if a piece in such a condition is subjected to stress in service, its different parts must respond in different degrees and that a concentration or localization of deformation may easily be the result, leading to premature fracture. Where cold-bending or dishing has been used, however, there is a further serious point to be borne in mind and this is the unavoidable presence of severe internal stresses in any such piece which has not been annealed.

This can be readily understood. In any bar or sheet which has been bent cold we have extreme deformation in tension on the one surface and corresponding compression

on the opposite side. The amount of such permanent deformation diminishes as we approach the neutral axis of the section and at some particular point we reach the region where, at the moment when the bending operation was being carried out, the stress just exceeded the elastic limit of proportionality. Within this region the metal had undergone no permanent or plastic deformation whether of extension or compression, but outside of it such permanent deformation exists. When the original bending or forming stress is released, the metal tends to revert to its original shape so far as those parts are concerned which were only elastically stressed, but this tendency is resisted by the outer regions which have undergone plastic deformation. Since these outer regions generally constitute the stiffer parts of the piece, it retains very nearly its shaped dimensions, but there is always a slight degree of distortion—too slight, perhaps, to be of any practical importance in itself, but large enough to be of serious importance in regard to internal stresses. Any "fiber" of the piece which is unable to return from its elastically-strained condition to its original dimensions is held in its new position by a force equal to that which would be required to stretch it into its enforced size—and such forces are very large, in view of the high elastic modulus of steel, even where the actual forcible extension is quite minute. These internal stresses, which are sometimes very complex in their nature and distribution, "add up" with the working stresses which come on the piece in service and this must often lead to "mysterious" failures in cases where the calculated working stress lies far below even the elastic limit of the material.

Annealing

Thus, there are two good reasons why cold-worked metal should be suitably annealed:

1. There is the adverse change in micro-structure accompanied by loss of ductility.
2. The internal stresses set up by cold bending and similar operations.

But, if annealing or heat-treatment of any kind is necessary, one of the chief attractions of the cold-working process disappears. Furnace plant, and the careful control which it requires, must be used and the perfect surface finish of cold-worked objects must be more or less sacrificed.

Further, the annealing process itself requires careful control. Otherwise the material may be unduly softened

and weakened. To realize this it is necessary to bear in mind that the strength of a mild steel of good composition and sound manufacture depends upon two principal factors which may be termed "grain size" and "carbide distribution."

"Grain size" is merely a question of the size or scale of the micro-structure; the smaller the crystals the better from all mechanical points of view. As a rule, crystal size can be readily regulated by avoiding the use of unduly high temperatures and securing rapid cooling at the end of the annealing process. Except in the cast of very heavy, bulky forgings, there is no advantage in cooling mild steel gradually.

Alloy Steels

Where alloy steels are concerned, the matter is somewhat different, as certain of these become hardened by rapid cooling, even in air, but these are generally treated in an entirely different manner by two thermal treatments usually called "hardening" and "tempering" respectively. Even in very mild steels, however, there is a certain danger about the annealing of cold-worked material. At certain temperatures and under certain conditions of cold-working, there is a danger of the very rapid development of extremely coarse crystals. This has been known to occur and has actually led to failures in automobile parts which have come under the writer's notice. There is, however, a perfectly safe course with regard to this trouble—if annealing or rather "normalizing" as it should be is carried out at a temperature decidedly above the critical range of the steel, then no coarse re-crystallization can occur. As we shall see, the use of these relatively high temperatures is also advisable for another reason related to the second factor in the strength of mild steel, viz., "carbide distribution."

Mild steel differs from nearly pure iron mainly by the presence in the former of a certain amount of iron carbide. Usually, this is present in mild steel in the form of the constituent known to microscopists as "pearlite," which is illustrated, under a high magnification in Fig. 7. This constituent consists of very fine alternate plates or laminae of iron and of iron carbide. Now the carbide plates are strong and hard but non-ductile. Their presence tends to harden and stiffen the steel because they serve as a sort of reinforcement to the soft and ductile crystals of pure iron. It is clear that if these soft crystals are small and the carbide plates are widely disseminated so as to produce the maximum amount of support, the steel will be, mechanically, in its best condition.

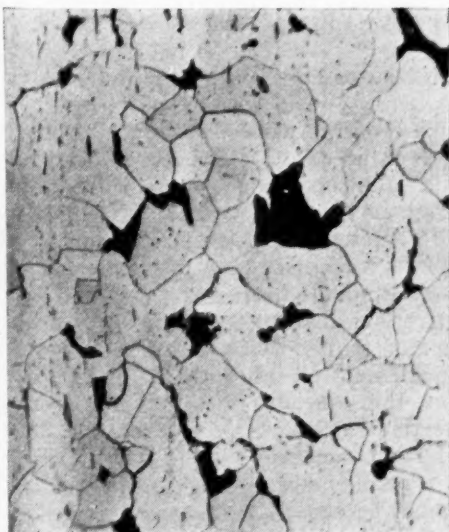


Fig. 4—Mild steel (Carbon 0.15 per cent) in normalized condition.

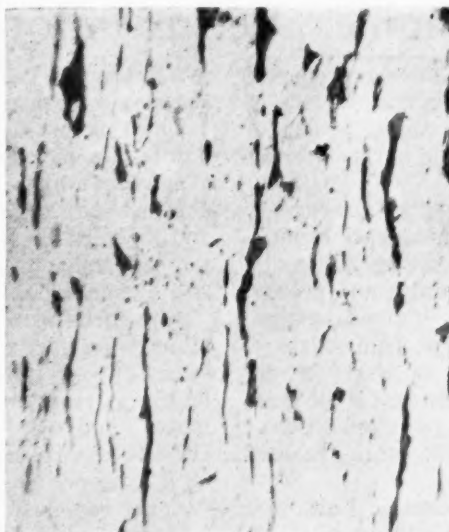


Fig. 5—Same material as Fig. 4 after moderate cold-working.

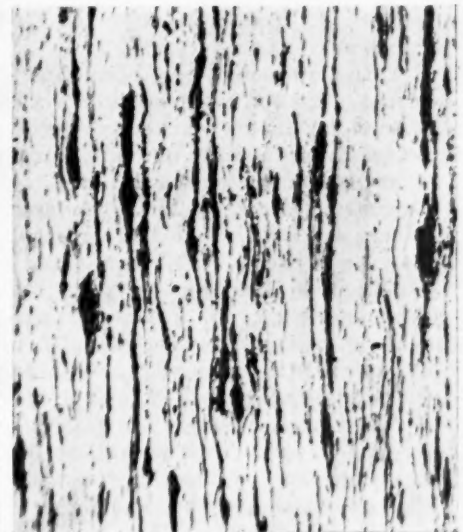
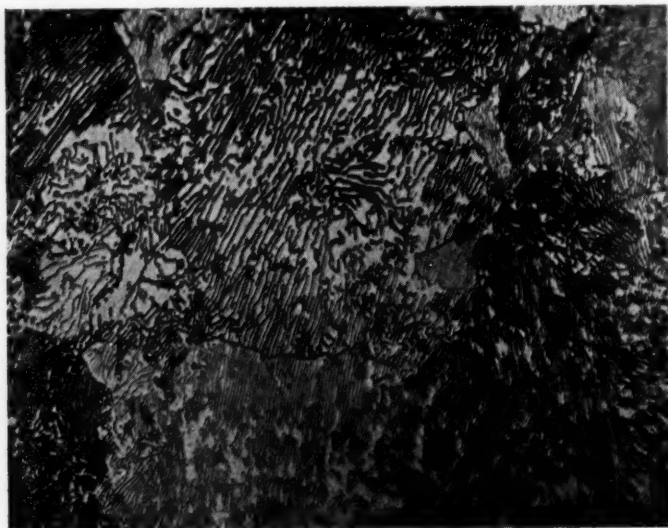


Fig. 6—Same material as Figs. 4 and 5 after severe cold-working.



7—Typical structure of "Pearlite" in steel



8—"Balled up" or "Globular" carbide in mild steel which has been softened by annealing below the critical range

We seek, therefore, to produce such a state of affairs and succeed in so doing by heating the steel to a point above its critical range. There the carbide plates disappear entirely, to be re-formed on cooling. Fairly slow cooling brings them out as moderately fine plates, interleaved with iron plates and fairly well distributed. More rapid cooling, however, produces a greater degree of dissemination, the carbide being often present in particles so fine as to be scarcely distinguishable under the microscope.

In this state, which is the result of good "normalizing," we have the steel at its best. On the other hand, very slow cooling leaves us with the carbide in a small number of comparatively thick plates and with many of the iron crystals entirely unsupported by carbide.

Still worse is the result of annealing at temperatures like 650 deg. C., just below the critical range of the steel. Here the result is that the plates of carbide become converted into numerous little rounded lumps and globules whose power of affording support to the iron crystals is practically nil. Here we have the steel—as seen in Fig. 8—in its weakest state. The ductility, it is true, is very high since the iron crystals can be stretched and deformed

without overcoming the resistance of carbide plates, but the elastic limit is extremely low and the resistance to fatigue quite small. Prior to cold-working, this is a very desirable condition for the steel—as makers of weldless cold-drawn tubes well know. If satisfactory service under stress is desired, subsequent normalizing is essential.

It is perhaps unnecessary to pursue these matters any further from the present point of view. We have very fully recognized the great advantages of cold-working processes, but the serious disadvantages must not be forgotten and the application of subsequent heat-treatment must be regarded as unavoidable where good resistance, particularly to fatigue, is required.

This heat-treatment requires careful control of temperatures and of rates of cooling and that it counterbalances some of the apparent advantages of cold working. Whether the combination of cold-working with subsequent heat-treatment is advantageous as compared with hot working is a matter for the production engineer to decide, since both processes can yield entirely satisfactory products with the softer steels. Where harder steel is desirable, of course, there can be no choice, since cold-working becomes impossible.

"Engine" Versus "Motor"

IN 1916 the Society of Automotive Engineers prepared, in co-operation with engineers and representatives of service departments of automobile companies, a list of standard names for the common automobile parts, in order to eliminate confusion that existed.

The standard nomenclature was approved by the Society members and largely followed by service managers in making up parts lists. This has resulted in saving a surprising amount of time and money in the definite and prompt making and filling of orders for parts. Certain names, the use of which was recommended in the nomenclature, were, however, not adopted as generally as might be desired, probably the most important of these being the term "engine" for designating an internal-combustion unit of the most prevalent type of automobile, the work "motor" being used to a certain extent instead.

"Motor" is the correct name for an electric unit used for changing electrical into mechanical energy, and its meaning as applied to internal-combustion engines can be understood only by the context. An electric *motor* is com-

monly used on gasoline automobiles in connection with the starting apparatus.

The continued misuse of the word "motor" is probably due to two factors. It is used, and correctly, to designate a moving vehicle. In addition, many companies building engines were organized in the early years of the industry and included the word "motor" in their official names. As the companies prospered, the names became valuable assets and a change has been considered unwise.

Nomenclature is, in a last analysis, determined by usage. Many words are common to-day which are in a derivative sense entirely illogical, as well as entirely different in meaning from what they meant originally. "Electric motor" and not "electric engine" is, of course, the name for the electric unit; and the term "steam motor" is not used as applying to a prime-mover. "Engine trucks" and "engine vehicles" would be equally anomalous.

There seems to be little doubt of the logic and consistency of the use of the word "engine" to denote the internal-combustion or "gas" unit of motor vehicles.

An Industrial Relations Policy That Makes Production Cost Less

Personal grievances are constructively met by interview and adjustment. Social activities are encouraged, but are operated entirely by employees. Executive training course raises standards of supervision. Small items and trifles considered important.

By Harry Tipper

THE Dayton Engineering Laboratories Co. operates an open shop. It is a successful open shop—not merely in the temporary control secured in some

the value of the spirit of unanimity which seems to prevail in this plant from one part of it to the other.

The employment department is charged with the duty

of introducing the worker to the plant, taking care of his grievances, adjusting details of difficulty which he may have, conducting the training classes, exercising decent supervision over the employees' activities, and maintaining contact at all times. With so many points of consideration, this department offers the best opportunity to observe the spirit of individual care exercised in placing the employee in his right position in the organization and endeavoring to give him an opportunity to find an expression for his fullest capacity.

The employment department, in considering an applicant for work in the Delco organization, depends to some extent upon standard questions—some of these questions being devoted to trade, knowledge and experience; some of them to individual

places during the depression or weakness of labor unions. It is successful because the average employee earns more money; the shop is provided with reasonable light and ventilation, decent conditions of work, and with a spirit of co-operation particularly visible, although no one thing can be cited as outstanding in connection with it.

There are no special systems of conference or representation in the plant. There does not appear to be any need for such items and, as we have pointed out many times, the system itself is worth little or nothing. It is only useful as it expresses pre-eminently the spirit of justice and decent co-operation which exists in the actions and ideas of the management. It is not possible to resort to system, therefore, to determine

DELCO

INDIVIDUAL GRAPHIC RATING

Final Rating.....

Rated By.....

Position of Rator.....

Date of Rating.....

Name of Employee.....

Occupation or Position.....

Branch or Div..... Dept.....

Check No.....

Instructions for Making Out This Report. Base the individual on the basis of the actual work he is now doing. Before attempting to report on this employee it is necessary to have clearly in mind the definitions of the qualities which are to be reported on. In each quality compare this employee with others in the same occupation in this company or elsewhere. Place a check (✓) somewhere on the line running from very high to very low that indicates approximately this employee's standing in each quality. It is not necessary to put the check (✓) directly above any of the division points.

QUALITIES	REPORT
I. Ability to Learn. Consider the ease with which the worker is able to learn new methods and to follow directions given him.	<div style="display: flex; justify-content: space-between; padding: 5px;"> Very Superior Learns With Ease Ordinary Slow To Learn Dull </div>
II. Speed in work. Consider the ability to work quickly and smoothly when necessary while performing the operations involved in his job.	<div style="display: flex; justify-content: space-between; padding: 5px;"> Very Quick Catch Moderate Slow Sluggish </div>
III. Accuracy. Consider the accuracy of his workmanship, his ability to turn out work that is up to standard.	<div style="display: flex; justify-content: space-between; padding: 5px;"> Accurate Dependable Careless Spoils Work Often </div>
IV. Industry. Consider his energy and application to the duties of his job, day in and day out.	<div style="display: flex; justify-content: space-between; padding: 5px;"> Very Industrious Energetic Indifferent Lazy </div>
V. Initiative. Consider his ability to go ahead with a job without being told every detail; his ability to make practical suggestions for doing things in a new and better way.	<div style="display: flex; justify-content: space-between; padding: 5px;"> Very Original Resourceful Occasionally Suggests Business Worker </div>
VI. Co-operativeness. Consider his willingness to co-operate in matters assigned to him.	<div style="display: flex; justify-content: space-between; padding: 5px;"> Co-operative Difficult to Handle Obstructionist </div>
VII. Knowledge of Work. Consider kind and amount of trade (or department) experience; knowledge of machines, tools, materials, etc.; his present ability on the job.	<div style="display: flex; justify-content: space-between; padding: 5px;"> Complete Moderate Meagre Very Slight </div>

Remarks.....

Total.....

Delco Form 116 10-6-20 (2,000)

Fig. 1—Individual qualification record card

EDUCATION																																																																																																		
COMMON SCHOOL 1 2 3 4 5 6 7 8	HIGH 1 2 3 4	COLLEGE 1 2 3 4	SPECIAL 1 2 3 4	GRADUATED FROM	COMMON	HIGH	COLLEGE	SPECIAL	AGE	ATTEND	DEGREE																																																																																							
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Fig. 2a—Individual graphic rating card

personal record; and some of them arranged from the best psychological tests. These questions and their answers are used, not as a means of rating the employee, but as the valuable aids to the interviewer in the rating, Fig. 1, which he will give to the employee after he has amplified the questions by casual elements of his interview.

The distinction is a slight one, yet it is important. In many cases, the adoption of standard trade, personal record, and psychological questions has been made to take the place of intelligent judgment in interviewing applicants and a large part of its usefulness has been lost. Men who are working in this employment department have evidently discussed the possibilities of all these standard questions so that their value is thoroughly understood, and the judgment to be exercised has come out of the intimate discussion of the objects which they have in view. The trade questions are arranged so that they are applied directly to the particular department or branch of the business for which the employee appears to be suitable on account of his experience and former occupation. Charts are used in connection with these questions, so that the interviewer may apply these with the charts to the particular performance of work and acquire a knowledge of the technique of the applicant.

From these various examinations an individual graphic rating is secured in accordance with the blank attached; those who are rated sufficiently to be worth putting to work are sent to the department on requisition from the different foremen or other supervisors. Each worker entering the employ of the company is given a booklet of

information and instructions. This booklet covers twenty-eight pages of matter divided so that reference may be made to the different important requirements. The language is very simple and the instructions are quite short. They can be readily understood by any worker who can read English, and few of them would permit of more than one interpretation. The general headings are taken from the Index, and the Introduction is shown because the wording of it makes it particularly worthy of attention in this discussion:

INTRODUCTION

To meet each problem broadly and master it—to reduce manufacturing discrepancies to a minimum—to be in the game for the love of it—these are some of the ideals this company has had in the past and which have helped to make possible our rapid success.

We will not arbitrarily curtail the rights of anyone, but we feel that certain standards must be set and certain rules established. This is done for the same reason that we establish limits and gages in the making of our product—so that the whole may work harmoniously together.

We are mentioning in this booklet the things which from our own experience and the experience of others will, we believe, maintain a spirit of harmony throughout our entire organization.

Will you, therefore, co-operate at all times and give close attention to the following Information and Rules.

(The instructions in this book are subject to change at any time and will be obsolete upon the issuance of a new instruction book. This issue supersedes all previous instructions.)

INDEX

I. Working Hours	5
II. Pay	9
III. Rates	11
IV. Attendance Records and Vacation Bonus	12
V. Reporting for Work	12
VI. Entering and Leaving Buildings	13
VII. Promotions and Transfers	14
VIII. Discipline	14
IX. Health and Sanitary Conditions	15
X. Condition of Machinery	16
XI. Absence	16
XII. Personal and Company Property	17
XIII. Visitors	17
XIV. Lost and Found Property	17
XV. Change of Address	18
XVI. Subscriptions, Presents, Etc.	18
XVII. Delco Relief Association	19
XVIII. Delco Athletic Association	19
XIX. General Motors Savings and Investment Fund	20
XX. Educational Activities	20
XXI. Delco Girls' Club	21
XXII. First Aid	21
XXIII. Personnel Activities	22
XXIV. Safety First	23
XXV. Special Regulations for Women Employees	27

The new employee is introduced to the employees' activities so that he may get into the community of interest at the earliest possible moment and feel himself a member of the organization instead of simply working there. As soon as a man is employed, a card is made out, Fig. 2, on which is kept a complete individual record and a complete service record, which is always available for examination, and which comes up under all necessary condi-

In addition to the educational activities, the employment office is active in the employees' associations and very directly concerned with the safety work. The Delco Athletic Association is one of these employees' associations, engineered very largely by the employment department where the athletic director resides, and governed by the members of the association, who are, of course, employees of the company. The only consideration given to the matter as a point of company policy is shown in one of the articles of the constitution of this association, where the Delco Athletic Committee, appointed by the Dayton Engineering Laboratories Co., selects the director of athletics. This committee works with the officers of the association, and through the director of athletics is represented on the board. In all other respects, the Athletic Association is entirely a matter of the employees and the

constitution specifically states that fact, so that the progress of the association and the development of the organization among the employees carries with it an increased organization spirit, because of the activities of the employees in this direction, and also increases the pride felt by the employees in the organization which is associated not only with their work, but with the growth of their own pleasurable activities through their own endeavors.

Interesting indications of the spirit of unanimity in the organization are found in the story of the Delco family week, which originated in 1919. A worker in one of the departments suggested that the families of the workers would like to see the place in which they were working. The suggestion was one of those casual ideas which are usually buried in the routine of daily operation, but in this case the suggestion was taken up and came to the attention of the factory executives, it appealed to them and arrangements were made. A little committee was formed and invitations sent to the families of all the workers. These families were arranged in groups for different days in the week. Guides were provided to take them through the factory and the whole week was spent as a family

week. Another Dayton man, John H. Patterson, some years ago decided that he should interest the wives in their husbands' organization. This Delco experiment seemed to work out equally well. Each family going through the plant was presented with a booklet especially prepared for that distribution, showing the whole plant, photographs of the workers and the departments, and the story of the various operations. It was rather an interesting side light on incentive to note that the record of production in that particular week was higher than any other week in the same year, despite the confusion caused by the visitors. In other words, every worker was anxious to do his best before the audience of his family and acquaintances, where a strange audience might have meant a little less attention to his production for the time being.

It will be seen at once that these activities are none of them more than what are usually called "trifles," but they have a very important part in aiding in the solution of the production problem, which has been well solved in respect both to turnover and cost, and matters that are capable of aiding in such a solution are not "trifles," however insignificant they may appear to be.

Current S. A. E. Standardization Work

THE Truck Division held a meeting on July 24 to consider the important subject of motor truck rating.

Other subjects were discussed and acted upon as recorded below. The Electrical Equipment Subdivision on Spark Plugs held a meeting on Aug. 18. The Subcommittee on Landing Fields of the Sectional Committee on Aeronautical Safety Code held a meeting on July 28.

Two series of meetings, as outlined in the accompanying table, have been scheduled for the months preceding the Annual Standards Committee meeting in January. The dates are subject to change, but Division and Subdivision members should bear them in mind in connection with any standardization work they are carrying on. In all cases individual notices definitely specifying the time and place of each meeting will be mailed to committeemen from ten days to two weeks in advance of the sessions. If meetings scheduled tentatively are cancelled or postponed, definite advices to this effect will be transmitted to them.

Aeronautic Safety Code

A meeting of the Subdivision on Landing Fields of the Sectional Committee on Aeronautic Safety Code was held in New York City on July 28. The original draft of the code covering this section was revised and will be reissued shortly for comment.

Body Hold-Down Clamps

A discussion on the standardization of body hold-down clamps at the Motor Truck Division meeting in July brought out the opinion that this subject is of more interest to body builders than to truck producers, inasmuch as the former usually make their own clamps. The following recommendation was, however, approved for adoption as S.A.E. Recommended Practice for the guidance of the smaller body builders:

The top or bottom flange of motor truck frames should not be drilled for body or hoist platform hold-down clamps. "U" clamps should be used with a wood-block filler between the frame flanges to prevent bending.

The use of too many hold-down clamps for securing the body to the frame should be guarded against, particularly in the mounting of very stiff bodies such as those for oil tanks.

Gages and Gaging

The report of the Screw Threads Division on Gages and Gaging was not approved at the meeting of the Standards Committee on June 20 at White Sulphur Springs, as reported in the August issue of *The Journal*, because it was felt that the report did not deal sufficiently with gaging for lead error. Earle Buckingham, who formulated the original report, has submitted the following paragraphs covering gaging for lead error as an extension of the report. These paragraphs have been referred to the members of the Screw Threads Division for approval.

A screw thread is comprised of several elements. First, the outside or major diameter; second, the pitch diameter; third, the core or minor diameter; fourth, the angle of the thread form; and fifth, the lead. There is a broad general principle in regard to limit gages that should always be kept in mind. Where compound tolerances are not involved, a "Go" gage with fixed measuring surfaces may check as many dimensions at one time as desired, and effective inspection will be secured. On the other hand, an effective "Not Go" gage can check only one dimension. By effective inspection is meant assurance that specified requirements in regard to size are not exceeded.

The most difficult element of a screw thread to gage is the lead. Lead testing devices for checking tools and gages are available, but in general their operation is too slow for use as production inspection equipment. In addition, the lead is the most important element of a screw thread as regards the nature of the contact between mating parts. Furthermore, an error in lead has almost double the effect of an equal error in diameter as regards interchangeability. Thus, for exacting threaded work, if the method of inspection of the parts produced does not effectively inspect for lead errors, the tools used to produce these parts must be carefully inspected for lead.

Progressive Dealers Make Pacific Coast Growing Future Market

Educational work being carried on among dealers and jobbers make for even better business in the West. Salesmen, garage men, and battery service agents are co-ordinating activities. Saturation point too far away to be worth considering.

By Gordon Lee *

DEVELOPMENTS of importance to manufacturers of automotive equipment were apparent on my trip through the Pacific Coast States. In the first place, the Western jobbers and manufacturers of automotive equipment, as a result of the educational work being carried on in behalf of the jobber and dealer by the Automotive Equipment Association, are now making an earnest attempt to follow out better business practices and eliminate the wastes from the methods pursued in the past.

I talked with many of the leading automotive jobbers and retail dealers, who felt that their profits in the future will come from better methods in eliminating the careless wastes which they have permitted in their business in the earlier days of their business career.

In San Diego a live dealers' organization exists which is not limited to a membership of dealers alone but embraces garage, repair and battery men so that there is being brought together through the combined ideas of these men a more complete understanding of the problems of automotive selling in all its phases.

In other words, the dealer no longer feels that the garage man and the battery man are merely a garage and a battery man but, due to a closer and more sympathetic understanding of the problems of each, there is a closer relation established which brings about a co-operation which characterizes not only the dealers' organization in San Diego but throughout the entire State of California as well. This is due in a large measure to the work of R. W. Martland, secretary of the California Automotive Trades Association, who is carrying on work of such a character as to be of immense value to the manufacturers in the East. Nowhere else in the country has a more complete organization been effected than in California, followed closely by Oregon, where the dealers' associations are

GORDON LEE has just returned from an extensive Western trip. He made a study of conditions on the Pacific Coast by traveling by automobile from San Diego to Seattle. On his trip through the Yosemite Valley he was accompanied by George Habermel, president of the California Automotive Trades Association and R. W. Martland, secretary.

He addressed nearly every dealers' association on the coast and talked personally with hundreds of them.

This article tells briefly, in a general way, some of his impressions of the West as an automotive market. It has been written exclusively for *Automotive Industries* and contains information of interest to every executive.

occupying positions of importance to the business welfare of the entire community.

Within the last year the Washington Automotive Trades Association has been organized under the guidance of L. E. Titus of Olympia, and much of the constructive work which has been accomplished by the Washington and Oregon organizations has already been started under his direction. The General State Convention, which I attended on July 21 and 22, 1922, was the best I have ever encountered, and I am sure that in no small measure the work carried on by these associa-

tions is responsible for the extensive sales promotion which has characterized the automotive trade at the coast.

I want to set at rest the feeling that there is such a thing as a saturation point in the sale of automotive products to organizations in the Pacific Coast. Developments are taking place in the west coast with such rapidity that these dealer organizations which are studying all phases and problems of their business are now to see in them the possibility of future sales expansion. National parks draw thousands of tourists monthly and bring service requirements which are not to be found in the East at any point. I visited Crater Lake, National Park, Yosemite Valley, Mount Rainier and the Grove of Big Trees and on every hand found machines from practically every State in the Union.

One dealer pointed out the fact that the minute these parks became so over-crowded that the tourists were turned away from them there were still many parks to be opened up and service stations and equipment would be produced to take care of them. With the Columbia River Basin project to be put forth in the State of Washington, 1,900,000 acres of fertile and irrigable land will be released of such productive nature that every owner of one of the 120 acre plots will be in a position in a year or two to purchase an automobile and accessories to go with it.

The Colorado River project with the Boulden Canyon

*Chief, Automotive Division, Bureau of Foreign and Domestic Commerce.

dam on the Colorado River will release waters to irrigate 3,500,000 acres of land, second only to the productive acres in the Imperial Valley. I could go on citing numerous other illustrations showing why the automotive industry is bound to go ahead with even greater strides than it has in the past. Take, for instance, the development of aerial navigation, which is becoming more and more apparent on the Pacific Coast. At the beginning and end of every aerial flight, it is necessary for a motor car or other automotive vehicle to be utilized to take the passengers into the city, thus opening up another avenue of sales.

Great natural resources exist in the Northwestern forests, in which most of the timber of the United States is still standing. After this is cut down and sold and converted into dollars it will represent an increased purchasing power to the Northwest which doubles back again on itself when this same land is opened up and converted into producing ranches.

The thing which impressed me most in addition to the natural resources of the country was the attitude of the

dealers and dealer associations who are attacking in common interest for the benefit of all the problems which confront all the automotive dealers of to-day. Men of picked caliber, such as L. E. Titus, president, and W. A. Simonds, secretary, of the Washington Automotive Trades Association; A. H. Brown, president, and Ralph Staehli, secretary, of the Oregon Trades Association, and R. W. Martland of the California Trades Association, are bringing about a realization of the possibility on the part of the dealers for the future in all automotive lines so that the Eastern manufacturer can look forward with confidence to the Coast States being one of their richest territories for many years to come.

Personally, I do not believe in a point of saturation because human intelligence and ingenuity will meet changed conditions as they arise. Certainly this is so in the West.

The purpose of my visit to the Pacific Coast was to bring a more intimate knowledge to Washington of the automotive industry which has heretofore not been accurately known by some of us here in the East.

Motor Buses Increase in Peru

THERE are sixty motor buses at present running in Lima, Peru. A year ago at this time the first one appeared. The great majority of the sixty have come out during the last six months.

Of these buses two are Chevrolet, two Graham Brothers, two Renault and three Benz. The balance are built on the Ford truck chassis. There is also a Mooreland truck converted into a bus.

The Ford buses, at least a portion of them, are limited to ten passengers. The great majority of the buses have both motorman and conductor, but a few are so arranged that the chauffeur or motorman could do all this work.

Most of the buses run from the Plaza Bolognesi to the Plaza de Armas, that is, from a point on the outskirts of the city to a point in the center. The distance is not much more than a mile. The fare charged is 10 cents Peruvian money, equal at the present time to about 4 cents gold. The reason why this route is chosen is partly because it does not compete in a direct line with the street cars, but more especially because it is the only route in the city that has good asphalt pavements.

A Ford automobile charges for 1 or 2 persons from Plaza de Armas to Plaza Bolognesi 50 cents Peruvian now about 20 cents gold. Street car fare is 5 cents second class and 10 cents first class Peruvian money.

The Mooreland bus, the two Graham Brothers buses and one or two Fords run from the Plaza de Armas to Miraflores, a suburb of Lima, six miles distant from the capital. The fare charged is now 30 cents, though there are rumors of a reduction to 20 cents. The interurban street car fare is 15 cents. Here again the reason why this route is chosen is because there is a good asphalt road between Lima and Miraflores that has been recently opened, the *Ave. Leguia*.

The buses have also begun running from the Plaza Bolognesi to Magdalena, over a macadamized dirt road, but this service is not yet well established. Also buses are running over one or two other streets of the city, despite their bad condition. It is not improbable, however, that the owners may find the cost of operation so high, owing to the bad streets, that they will be compelled to take their buses off.

The buses of Lima are privately owned, but operated under the direction of the traffic police of Lima, at the terminal points. The growth of the bus business in Lima has far outstripped street paving and road building. The only thing that at the present time prevents their being five times the number of buses there are in Lima and vicinity is the lack of five times the number of good streets and roads.

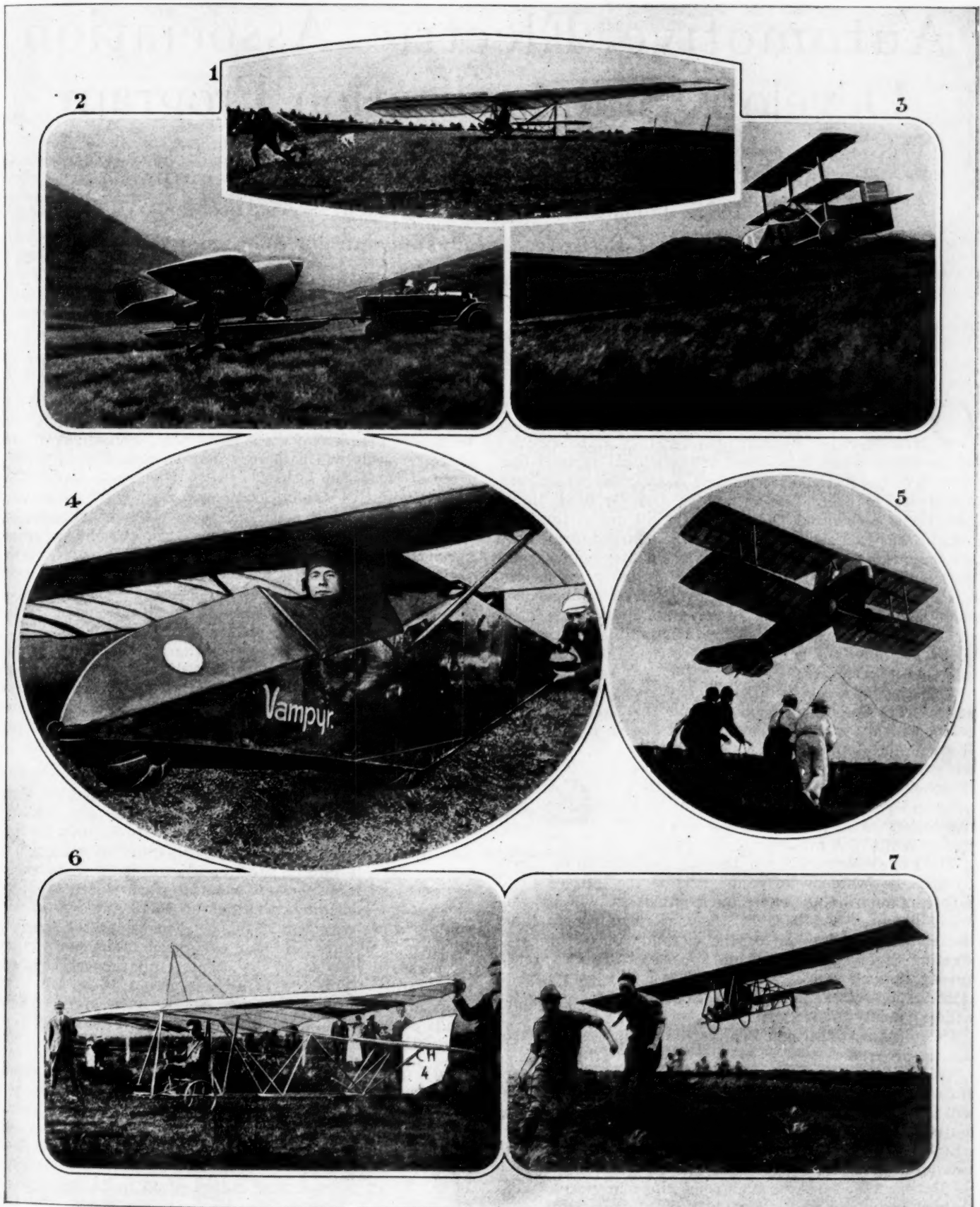
Outside of Lima, in the Provinces, motor bus or automobile service was in force between Tarma and La Oroya in the central Andes before it came into vogue in Lima. A Stanley steamer made the trip from Tarma to La Oroya in the south. Automobiles are now carrying passengers from Ica and vicinity to Lurin, the nearest point of rail connection with Lima. Here a motor bus will soon be following in the track of the automobile.

Exports of automotive products from Canada during July reached the total value of \$1,818,359—an increase of about 21 per cent over the exports during June, which more than makes up for the decrease of 13 per cent during the latter month as compared with May, according to the Automotive Division of the Department of Commerce.

The markets of Canadian automotive manufacturers have not increased steadily as have those of American producers nor have they been stable in their demands, the Division states. Since the first of the year each increase in the value of Canadian exports has been followed by a decrease and each decrease by an increase, with the exception of March and April, when two consecutive decreases were recorded.

The number of passenger cars shipped monthly has fluctuated from 1334 in January to the high point of 2985 in March. July shipments of 2812 cars valued at \$1,566,194 coming close to the March record and marking an increase of 24 per cent in number and 10 per cent in value over passenger car shipments during June. There were 211 trucks exported at a value of \$99,052, an increase of 24 per cent in number and 33 per cent in value, while parts shipped reached the value of \$153,113, a gain of 51 per cent in value.

Gliders in Recent European Contests



(Copyright, Wide World Photos)

1—The Harth-Messerschmidt motorless airplane, which established a mark of 21 minutes, 37 seconds in the air in competition recently for the Rohn Prizes. 2—The glider of Deshayes at Clermont-Ferrand, France. 3—Clement de Sardier, noted French aviator, taking off in his triplane glider, at the recent international gliding meet held at Clermont-Ferrand, France, in which he remained in the air for 80 seconds. De Sardier's plane was the only triplane contesting. 4—F. W. Hentzen and his motorless sailplane in which he broke the world's glider record by attaining an altitude of 1200 feet, remaining in the air 3 hours and 6 minutes, at Gersfeld, Germany. 5—The French airman, Douchy, starting from the summit of the Puy de Dome, to fly for 9 minutes and 2 seconds in his motorless biplane glider, besting all previous French performances. 6—The frail monoplane glider of Aubut, a French entrant in the international airplane glider competition at Clermont-Ferrand, France. 7—Allen of United States glided 1000 meters and rose 45 ft. This glider was built at the Massachusetts Institute of Technology. (Copyright, Brown Bros.)

Automotive Electric Association Develops Standardization Program

Annual summer convention well attended by major executives. Active standardization work undertaken. Service problems given attention. Desire car dealers to introduce owners to electrical service stations where necessary equipment is available.

By David Beecroft

OLD ORCHARD, ME., Sept. 1—Consistent pushing of a comprehensive program of standardization in electric starting, lighting and ignition units was one of the major topics considered at the annual summer convention of the Automotive Electric Association which completed its four-day session at the Old Orchard House here. The convention, the best in the history of the association, was well attended by all of the manufacturers with the exception of two, most of the companies being represented not only by their presidents or major executives, but also by their chief engineer, their service manager, and their legal representatives. Approximately 65 were present, including a dozen members of their families. President A. D. T. Libby, of the Splitdorf Electrical Co., presided at all general sessions.

The members realized the urgent necessity for more active work in standardization, and the standardization committee, under the chairmanship of Joseph Bijur, of the Bijur Motor Appliance Co., is already well under way with its standardization program. This program was really launched at a meeting held earlier this year at Atlantic City and was carried forward later in conjunction with the Society of Automotive Engineers at its summer meeting at White Sulphur Springs in June.

The basic consideration in this standardization work will be to make haste by not standardizing too hurriedly but rather standardizing where such standards will be generally accepted and used by the majority, if not all, of the manufacturers. All of the eleven manufacturers of starting, lighting and ignition apparatus are very much agreed on such a program, and there is a keen appreciation of the fact that most of them are manufacturing too wide a variety of designs.

Here is how Chairman Bijur summed up the standardization program:

"We are starting to standardize the size of electric generators as determined by the electrical output of them and will classify the different generators into different groups on this basis so as to have a minimum number of different sizes. We plan, also, to similarly standardize starting motors as determined by torque and power.

"In this way, perhaps, five or six different sizes of generators known as No. 1, 2, 3, 4, 5 and 6 which will serve for all engine requirements, will be agreed upon.

"The plan is then to follow this by an agreement in the size of parts entering into these generators and starters so as to arrive ultimately at a fair degree of uniformity of construction. It is probable that if this is agreed upon,

it may be possible for different makers to use the same size of brushes, bearings, field coils, lubricating devices, terminals, etc., and if there is not total agreement in this, there certainly will be a very marked reduction in the variety of parts now in use."

This tentative standardization program will be submitted to the engineering departments of each of the electric manufacturers with an invitation to criticize the suggested specifications and suggest other possibilities of carrying the work further. It is hoped that manufacturers of cars, trucks and other vehicles, as well as large service organizations, will not only criticize the specifications but make suggestions on further phases of standardization.

Up to the present, the association standards committee has suggested specifications for different sizes of generators. These specifications are not final, they have not been adopted by the association but they are formulated for the purpose of receiving criticisms and suggestions. The generator program suggests six sizes, as follows:

No. 1 Generator—This, the smallest suggested generator type, is one intended for small cars using rather high-speed four-cylinder engines and the specifications are intended to be sufficiently broad so as to embrace practically all that are manufactured at present. The required output, hot performance, is zero amperes at $6\frac{1}{2}$ volts at 9 to 11 m.p.h. car speed; 7 amperes at 7 volts at a car speed of 14-16 m.p.h., and a maximum output of 10-13 amperes at $8\frac{1}{2}$ volts at a car speed of 23 m.p.h. The generator speed is 70 r.p.m. per mile per hour car speed. The permissible temperature rise is 100 deg. centigrade above the room temperature. This rise being measured $\frac{1}{16}$ in. from the armature within the housing of the generator. There would not be such a temperature rise with the car in motion and with air circulating around the housing.

No. 2 Generator—This generator, intended for all medium six-cylinder cars, would operate at 63 r.p.m. per mile, per hour car speed, a slower speed than No. 1, and would have a permissible temperature rise of 90 deg. centigrade. Its cold performance would be: At $6\frac{1}{2}$ volts, zero amperes at 7 to 9 m.p.h.; would give 7 amperes output at 7 volts at 12 to 14 m.p.h., and a maximum output of 15 to 25 amperes at $8\frac{1}{2}$ volts at not more than 20 m.p.h. car speed. Its hot output would be: A zero output at $6\frac{1}{2}$ volts at 9 to 11 m.p.h. car speed; an output of 7 amperes at 7 volts at 14 to 16 m.p.h.; a maximum output of 12 to 15 amperes at $8\frac{1}{2}$ volts at not more than 22 m.p.h., and a maximum output of not more than 11 amperes at $8\frac{1}{2}$ volts at 30 m.p.h.

No. 3 Generator—This generator would be a slower speed design than No. 2 but having a hot and cold performance the same as No. 2. It would give its output at a lower speed and would use an engine speed or ratio of 1 to 1. This would be suitable for four-cylinder engines on trucks or where quietness and slow speed are most desired in passenger cars.

No. 4 Generator—This is a voltage type generator working at a speed of 45 r.p.m. per mile per hour car speed and is intended for the largest types passenger cars. Its cold performance would be: An output of zero amperes at $7\frac{1}{2}$ volts at 8 to 10 m.p.h. car speed; an output of 7 amperes at $7\frac{1}{2}$ volts at 12 to 14 m.p.h.; an output of 20 amperes at $7\frac{1}{2}$ volts at 16 to 20 m.p.h. Its hot performance would be: An output of zero amperes at $7\frac{1}{2}$ volts at 10 to 14 m.p.h.; an output of 7 amperes at $7\frac{1}{2}$ volts at 13 to 16 m.p.h., and an output of 20 amperes at $7\frac{1}{2}$ volts at 20-25 m.p.h.

No. 5 Generator—No attempt was made to write any specifications for this type of generator intended for motor bus service further than to describe it as a 375-watt type with an output of 25 amperes at 15 volts. This would be a 1-to-1 ratio machine. Some manufacturers are developing machines of this type at present and others are manufacturing them.

No. 6 Generator—No effort has been made to write even tentative specifications for this type but the indications are that perhaps a 750-watt machine is needed for airplane, aircraft and gasoline railway car use. It would have an output of 50 amperes at 15 volts.

The standardization committee is particularly anxious to get suggestions on specifications for generators No. 4, 5 and 6. Concerns operating motor bus lines and others in aircraft or railroad car work are invited to send in their suggestions.

The standards committee has not made much progress in writing its specifications for electric starting motors. And those written so far are largely tentative. The plan is to have a series, the number in which series has not been settled.

No. 1 Starting Motor.—Tentative specifications for this, the smallest starting motor type, are that it should deliver a lock torque of 10 lbs. at 1 ft. radius with not more than 500 amperes at $3\frac{1}{2}$ volts. This would be at a 1000 r.p.m. This motor is for the small car and would be intended to line up with the No. 1 generator. It would be a direct acting motor, that is, the pinion on the armature shaft meshing with the flywheel ring gear.

The standards committee has not outlined any specifications for additional starting motors, but plans to arrive at some in the near future along the lines suggested.

President Libby for Standards

That the entire Automotive Electric Association is solidly back of its standards committee in a realization of the necessity for standardization was well brought out in the address of President Libby, himself a strong advocate of standardization and who described it as the light that would lead the manufacturers in the development of their new designs. President Libby summed up his views on this by enumerating nine stumbling blocks that have stood in the way of a greater standardization of electric equipment. These are:

1. There is no concerted or systematic effort made in the way of publicity to show the advantage of using more highly standardized products.
2. There is a disposition on the part of a few manufacturers not to use approved standards, evidently due to a desire to retain complete individuality.

3. That standards should be better commercially and cheaper to manufacture.
4. That standards have generally been approved as the result of a compromise in an attempt to meet divergent views.
5. That the engine designers have been considering electrical equipment last.
6. That a standard may be anything which any company is making in large quantities.
7. That, under present market conditions, electric equipment manufacturers find it impossible to even standardize their own productions.
8. That under market pressure electric equipment manufacturers yield to the demand for special machines on large orders.
9. That present designs (standards) were approved practically without trial. Many times there is no approach to what engine designers want in these standards.

Close to the problem of standardization and in no sense secondary to it, the members of the Automotive Electric Association are considering service, and in this are confronted with major problems. Perhaps no problem is greater than that arising out of the fact that the automobile manufacturer in his 90-day warranty explicitly states that his guarantee does not cover starting, lighting and ignition apparatus plus batteries. The electric manufacturers, generally, and they are not unanimous in this, are of the opinion that if the car manufacturer will not personally guarantee the electric product on his car then he should at least recommend that the service on this electrical equipment should go to those authorized service stations created by manufacturers of electric equipment.

Dealers Lack Equipment

At present, many motor car dealers want to service the electric parts, but many of the equipment makers declare they have not the necessary electric testing stands and equipment and that many of them have no electric workmen who would meet the test requirements of these makers.

The electric equipment manufacturers would, generally speaking, like a general adoption of what is known as the registration plan followed out. This plan is that when a car dealer makes a car sale he will give to the purchaser a card which virtually introduces him to the authorized service station of the maker of the electrical equipment on the car, so that this owner will virtually register his electric equipment with this electric service man.

There is a more or less general disposition among several of the electric equipment manufacturers to have the electric service done by the car dealer, providing he will install the necessary equipment and engage necessary help.

The greatest difficulty in this electric service comes frequently in the small town of 2000 population or under which finds difficulty in supporting an exclusive electric service station due to the fact that the car dealers endeavor, generally, to do their own electric servicing.

One manufacturer of electric equipment told of investigating the ability of car dealers in a certain section to adequately care for electric service and discovered that only 1 per cent measured up to service requirements.

So great is the importance of the service problem that the service committee of the Automotive Electric Association will hold a meeting every 90 days, this being held one day in advance of the meetings of the Board of Governors, so that speedy approval may be taken by the Board.

Little can be said about the work of the legal and patent committee under Chairman Victor S. Bean, patent counsel for Westinghouse Electric & Mfg. Co. This committee works very largely in settling patent controversies among members and preventing unnecessary legal litigation. The membership feels that perhaps hundreds of thousands of dollars have already been saved in this regard.

Distribution of 10-cent Fare in Motor Bus Operating Costs

Policies and methods that have worked successfully. Overloading buses unwise. Bus selling involves a knowledge of operating methods, etc. Data on bus operation and costs in New York City.

By G. A. Green*

WE are unqualifiedly behind any movement that will aid the bus to come into and remain in the field that is peculiarly its own. We are positive that the short road is the seated load and if builders will bear this in mind from the standpoint of design and warranty, the automotive industry will assuredly find ample repayment.

We earnestly hope that the automotive industry will read the writing that is so plain to see and that it will profit by what has occurred with the street railways, in regard to the matter of overloading. For it must be remembered that the bus has its limitations and that it is not the cure-all for every ill that transportation is heir to.

Strictly speaking, there is no actual relationship between the design of a bus and the fares charged to passengers. Obviously, however, the better the design, the lower will be the operating cost. Naturally, this will make for lower fares. We believe that in the present state of the art no real success can be attained with less than a 10-cent fare. We are, of course, assuming operation based on seated loads and ample service during both the light and the heavy hours. But with character service, properly designed and maintained equipment, the people are quite willing to pay a 10-cent fare. There is ample evidence of this in New York City, Detroit, Chicago, Toronto and other cities.

The necessity for a 10-cent fare does not rest with only the bus. Many electric railways need a 10-cent fare in order to be put on a paying basis. The last available tabulation shows that 140 electric railways in the United States are receiving a 10-cent fare, and that over 95 per cent of the electric railways in the cities of the United States have received varying increases in fare during the last few years. Some cities have a first fare of only 6 or 7 cents, but to this must be added a charge for transfers. Many cities have been placed on the zone system that works out in some cases as high as 3½ cents per mile. Even with an increased fare, the last available figures

show that about 10 per cent of the electric railways in the United States are in the hands of receivers.

Obviously, a correct comparison of operating expenditures can be made only on the assumption that similar detail classifications are employed in conjunction with a similar accounting system. Here the difficulties begin, for as yet few companies operating buses use the same accounting methods.

There is shown in Table 1 not the customary detail cost statement, but what might be described as an income analysis. Actually it represents a distribution of

the dime as received from each of those who rode on our buses during the year 1921.

From these figures it is abundantly clear that we should have made a very bad showing with a fare of less than 10 cents. Here is emphasized very clearly the fact that the success or failure from the standpoint of an undertaking such as our own depends absolutely on the addition or subtraction of what at first sight appear to be

insignificant amounts. To emphasize this point, during 1921 we carried a total of 52,216,946 passengers, so the net income from this source at 1.44 cents per passenger works out at \$751,924.02. To permit of a comparison being made between the conditions confronting us and

EVERY bus manufacturer will be interested in this study of operating costs of the Fifth Ave. Coach Co. We printed some time ago those parts of Mr. Green's paper dealing exclusively with design, but held this cost discussion for separate consideration.

Bus selling for some years to come will involve a good knowledge of operating methods, costs, and possibilities on the part of the vehicle manufacturer.

TABLE 1—DISTRIBUTION OF EACH FARE RECEIVED

	Cents
Total Operating Expenses	6.77
Total Taxes	0.86
Reserved for Injury and Damage Claims	0.08
Reserved for Depreciation	0.60
Interest on Capital Investment	0.55
Net Income	1.44
Total	10.00

those faced by others, it should be noted that we operate a total of 25 miles of one-way route, that our longest run is 10.2 miles and our average haul 5.0 miles.

Something may be gained by outlining the character of service that must be expected, for it is here that the average engineer underestimates the difficulties to be

*General Manager Fifth Ave. Coach Co. Excerpt from paper read before Summer Meeting of S.A.E.

encountered. First, let us consider the cumulative result of a year's performance of the physical limitations that are primarily responsible for wear-and-tear. For the sake of argument it may be assumed that these data are applicable to any bus operated by any public utility. The figures are presented in Table 2.

TABLE 2—DATA ON BUS OPERATION IN NEW YORK CITY

Yearly Mileage	30,000- 60,000
Stops and Starts	180,000-360,000
Change-Speed Applications	360,000-720,000
Clutch Applications	360,000-720,000
Different Drivers	1,460- 2,920
Brake Applications	200,000-400,000

Assuming the same general plan of upkeep as employed by the Fifth Avenue Coach Co., each bus would be thoroughly inspected after every 2000 miles of operation and rebuilt and repainted yearly. A vehicle would be expected to require no incidental repairs between inspectional periods and no major repairs between either inspections or yearly overhauls. The inspectional periods would occur approximately every 14 days. The maximum inspectional allowance is 8 hr. The allowance for yearly overhaul is 7 days. Roughly, it may be said that under these conditions, each bus is scheduled for service 342 days out of 365.

The statistics quoted as to mileage, stops and starts, and the like, speak for themselves. Those who have never had control of a public utility operating buses cannot possibly picture the sum total of the abuse the aver-

age bus must suffer. More than anything else, frequent changes in drivers result in increased service difficulties.

It may be safely said that if one could with a bus have the same driver daily, at least 50 per cent of the service troubles would disappear. This, however, is quite impractical, since the loss in earnings would many times offset the decreased service cost. Even with an operation of moderate size, the bus must of necessity lose its identity. It becomes merely a transportation unit. There must be changes in drivers daily, many of whom will feel scarcely any pride of ownership. All they are concerned with is being on schedule time. This means that the bus will be subject to extraordinary abuse. The mechanisms of the bus must be capable of treatment of the most brutal nature; otherwise constant failures will occur.

BEFORE one can proceed very far from a design standpoint, there must be some fairly clear conception of the vehicle life that is to be expected. In this connection it is necessary to lay stress on the fact that motorbus design is still in its initial stages. Five to 7 years is about the maximum life of the most modern type. It is not a matter of wear-and-tear, for a vehicle may be so well cared for that there is no limit to its life. Obsolescence is the real issue. The ideal conception is to carry out the design so that the various units which when assembled comprise the complete structure have as nearly as possible an equal life.

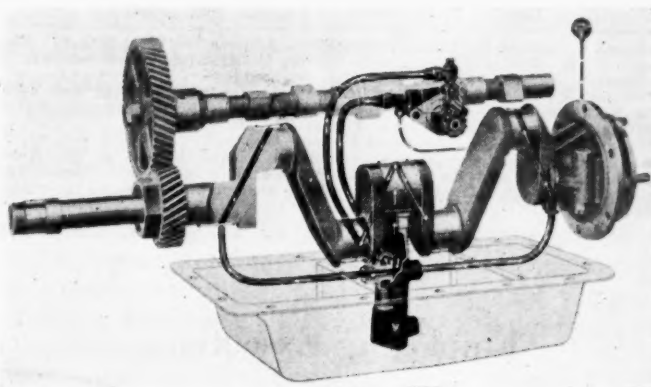
Maxwell Engine Changes

MAXWELL cars are now coming through with three-bearing crankshaft engines in place of two. Beyond this alteration the cars are exactly the same as recently described. The three-bearing crankshaft has necessarily brought with it some alterations in the crankcase and bearing mountings and on the new shaft an oil slinger ring is incorporated. The cylinder block, pistons and all of the structural parts of the engine unaffected by the crankshaft remain as before and the engine taken as a whole is the same product which has been developed over a long period of years for the Maxwell cars.

The new shaft is unusually heavy and consequently rigid for this size ($3\frac{3}{8}$ by $4\frac{1}{2}$ in.) engine having a center bearing diameter of $2\frac{1}{4}$ in. The diameter at each end bearing is $1\frac{7}{8}$ in. It is pointed out by the Maxwell engineers that this bearing length is approximately one-third of the total length of the shaft. The overall length of the engine remains unchanged.

In connection with the new crankshaft the lubricating system has been altered to take care of the interior of the engine by full pressure through a drilled crankshaft in place of splash. The oil pump is now a gear driven type operated from the camshaft. Oil is pumped under a pressure of 10 lb. per sq. in. at normal speeds through three large leads to the three main bearings. The front end bearing is so designed as to permit a flow of oil direct to the timing gears. Oil is also supplied to the lower connecting rod bearings through the drilled shaft and by spray from the rod ends to the pistons and other working units.

While there has been no fundamental change in the gasoline vaporizing system, the ramshorn type of manifold adopted some time ago being continued, the carburetor is now the Stewart. This is the only alteration in the ex-



New Maxwell three-bearing crankshaft

terior of the engine. The powerplant is the unit type and the clutch and gearset members remain unaltered except for a double row annular ball bearing in the rear of the transmission shaft in place of the plain bearing.

SIX hundred and twenty-one thousand three hundred and seventy miles of flying with passengers, freight and mail were completed by the Royal Netherlands Aeroplane Company on July 22, 1922, says Consul Mahin, Amsterdam, in advices to the Department of Commerce.

Not a single accident has occurred, the consul reports. This company has a daily service between Amsterdam and Paris and a twice-a-day service between Amsterdam and London. The distance over each of these routes is approximately 300 miles.

AUTOMOTIVE INDUSTRIES

AUTOMOBILE

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Employing Executives

CONSIDERABLE study has been given to the problems of selecting the proper workers for given jobs in the factory. Similar efforts have been made in connection with routine jobs in the office. Methods of gathering a large number of applications have been devised, with a view to carefully selecting the men best fitted for the position.

The facilities for getting a well-sifted list of engineers and executives have not been so well recognized. In filling jobs of this character the manufacturer has usually "looked around" in an indefinite sort of way without actually getting a clear vision of all the prospects in the field. As a matter of fact, selecting men for executive positions requires far more consideration than does selection for routine office or factory jobs. The cost of making a mistake in choosing a man is far higher in the latter case.

The employment departments of the engineering societies offer an especially good opportunity for getting in touch with the best fitted men for executive positions. The Society of Automotive Engineers has recently expanded its employment work to a point where it is capable of giving manufacturers very helpful and competent service.

The same thing is true of the Engineering Societies Employment Service in which the A. S. M. E., A. S. C. E., A. I. M. M. E., and A. I. E. E. are combined. This latter service, for instance, supplied nearly two thousand men to manufacturers during the first six months of this year.

These services are equipped to interview applicants and to judge with a high degree of intelligence the qualifications of the applicants for the positions open. In this way they reduce the number of applicants the manufacturer must investigate and interview to a minimum.

Glider Deductions

THESE days of dreams as to the possibilities of airplane gliders are apt to lead our thoughts far afield into avenues which seem now to border on the impossible.

The German tests, when the complete report is published, may show that a very great percentage of the reason for flights of 3 hours or longer is due as much to a study of the topography of the surrounding territory and to a study of general atmospheric conditions as to the design and operation of the gliders.

The use of gliders will accomplish a great good if it does nothing more than lead to a much more minute study of atmospheric conditions. The extent to which a study of atmospheric conditions, wind currents, etc., will aid commercial aviation, is practically an unwritten book. Such a study may have quite a distinct effect on reducing the number of airplane accidents, as there are cases on record where accidents were apparently directly due to ignorance of such conditions and might have been avoided had the operator studied such.

A case in question is that of a recent fatal accident where the aviator was killed by the plane falling into a small lake soon after the take-off. The take-off was from a sun-baked field near by on which was a large concourse of people. Undoubtedly there were upward air currents caused by the condition of the land, and accented by the people, which aided in lifting the plane to a certain extent after it left the ground. Over the surface of the lake with its cool water conditions were different, there doubtless being a downward current because whatever goes up must come down can be applied to air as well as to heavier objects.

Continuous experimentation with gliders should not only lead to greater safety in aerial navigation, but should focus attention on greater efficiency as well.

The high cost of aircraft transportation is today retarding the development of the art. Our air-

planes developed generally under the command of war had an abnormal development not only numerically but from the economic viewpoint. There was no lock on the treasury to hamper development. If more power were needed, dollars were the answer for such by the development of lighter and more powerful engines. If greater speed were needed, the answer was found in more dollars; in short, money was the open sesame resorted to. While such a program of development was satisfactory and commendable in war, it may not prove economical in days of peace when aerial transportation can grow only if it has regard for the cost.

The development of the glider will doubtless bring about a closer study of aircraft design apart from the engine; it should result in a lighter construction and a more efficient machine, so that less horsepower will be needed for a given performance; and it should accelerate the detailed study of atmospheric conditions that will not only render transportation cheaper but safer.

Durability vs. Cost in Batteries

FROM time to time we have drawn attention to the fact that there is much to be desired in respect to the serviceability or durability of the storage battery used in the average car of to-day. In a piece of publicity recently sent out by a prominent battery manufacturer, it is frankly admitted that the demand for lighter and cheaper batteries has resulted in their being manufactured in such a way that their average life is much below former standards. In short, they are built down to a price and not up to a high standard of quality.

The car owner, of course, takes the grief which usually comes about the second year of the car's life. In general he pays from two to four times what a reasonably serviceable battery would have cost the car manufacturer in the first place and the battery he receives is no better than the original one was when it was new. The car manufacturer saves perhaps \$5 to \$10 with the net result that the operation of the car costs the owner, during the entire life of the car, probably \$50 to \$100 more than it should. Besides, there is the frequent annoyance caused by trips to the service station occasioned by failure of the electric system to function properly.

This condition arises from a shortsighted policy which sooner or later is certain to react upon the car builder as well as the battery manufacturer. How many car purchasers would not gladly pay an additional \$5 or \$10 for a car if they knew that by so doing they would be saved several times that amount within two years, not to mention the advantage of a much greater freedom from trouble?

Items such as this simply aggravate the service problem and help to make the used car problem even more serious.

The time has come when many believe that it would be better for all concerned if manufacturers would

pay more attention to improving quality and less to simply making something cheaper.

The Rail Strike Injunction

WITH hard and soft coal miners back at work, the industrial horizon still is beclouded by the rail strike. There are no present indications of a settlement of this difficulty. The railroads apparently have won, in the East at least. The handling of a record breaking Labor Day exodus was looked upon as a crucial test and the Eastern carriers met it surprisingly well. Roads in other sections of the country, particularly the South, are not so fortunate. It seems probable, nevertheless, that all of them will gradually escape from their difficulties.

Both sides to the controversy seem to be deeply incensed at the action of the administration in obtaining the most sweeping injunction ever granted against strikers. Labor stamps it as an attempt to crush unionism while the carriers contend that the complaint of the attorney general, alleging that transportation threatens to collapse, was based on ancient history.

If the Daugherty injunction stands and crushes the strike, it is likely to change the whole trend of trades unionism in the United States. Under existing conditions it would foredoom to failure any strike which would interfere seriously with the industrial life of the nation. It is too early yet, however, to predict the course of the court proceedings. They probably will result in a bitter legal battle with the Supreme Court ultimately deciding the issue.

Provided the injunction is made permanent and is sustained in the higher courts, the strike will have lost much of its effectiveness as a weapon to enforce the demands of labor. It inevitably will breed radicalism and will give great impetus to the Foster campaign for One Big Union. Gompers and his conservative associates may find themselves forced to align themselves with the element they have fought consistently for years. The very life of unionism, as they understand it, will be at stake.

Time alone can disclose the full effect of the course taken by the administration. It is not likely to result in a general strike at this time although the potentialities of the situation are sinister.

With no labor difficulties of their own, except a shortage of help, automotive manufacturers are more concerned for the moment with the freight jam which will follow the movement of coal in abnormal quantities simultaneously with bumper crops at a time when an extraordinarily large amount of rolling stock is in bad order.

Industry as a whole probably will not feel the full effect of the strikes for another month. Its problem will not be one of fuel but of getting cars to move its finished products and bring in raw materials.

The automotive industry will be wise, in shaping its policies, if it gives full consideration to the virtual certainty of unprecedented freight congestion for the remainder of the year.

Plants Keep Wheels Running Full Power

Production Being Maintained at
High Speed—Parts Makers
Keep Pace

NEW YORK, Sept. 6—Henry Ford's announcement of his intention to close his plants Sept. 16 because of the coal situation has not upset the rest of the automotive industry to any appreciable extent. Other leaders are making every effort to meet the situation and keep their factories up to the record breaking production pace the industry as a whole has been hitting the last few months. They will keep the wheels turning just so long as they have any coal left.

Hope for Strike Improvement

A survey of the industry shows that nearly every one is able to secure the necessary power and that they will not have to worry over the situation for at least two weeks more, when it is hoped the strike situation will have been improved.

More serious, in the minds of many, is what will happen after the coal strike is ended. It is feared that the railroads will be called upon to haul so much coal as well as handle the crops that industry as a whole will suffer through inability to secure transportation needed to bring materials into the factories and deliver the finished product into the hands of the dealers. It is thought that this situation may slow things a bit, although driveaways will relieve the situation so far as car deliveries are concerned.

Outside of the coal and transportation situations, the automotive industry is enjoying an unexpected prosperity. Production is being maintained at a record breaking clip and it is declared that when the August reports are all in it will be found that the industry has made more cars in the eight months of 1922 than it did in all of 1921. Indeed, it is believed that the production figures for the full year of 1922 will be greater even than the record breaking 1920, when 2,205,000 motor vehicles were turned out.

Parts Orders Increased

This prosperity is not confined to the car makers alone. The parts people are keeping step with their customers. Reports received show that there are enough orders on hand right now to keep the parts and accessories plants busy until after January. A surprising angle is that within the

Business in Brief

It is felt that the ending of the coal strike has benefited trade and industry to a certain extent and that the rail strike is the main deterrent. If the railroads can meet the demands that will be made upon them through the heavy movements of coal, materials, etc., and it is thought they can, the general outlook will be much brighter than it has been in some time.

Free movements of finished products to market are slowed by the rail strike, but it is felt that it will not be for long. Coal moved well last week, 10,000,000 tons of soft being produced as against 6,250,000 the week previous. Iron and steel prices are higher and production still is curtailed. While pig iron is moving freely, some points in the West report premiums being paid by needy purchasers.

There are new low levels for grain prices but other foods are higher. Corn is gaining in the Ohio valley, Missouri and Iowa, but is off in the Northwest and Southwest. Strike conditions affect cotton, lumber and crops in the South.

In a business way the fall jobbing trade is slightly improved. Cotton print cloths are firmer; hardware prices are stable; shoes and leather are selling better and so are silks and jewelry. Less activity in the retail trade is reported.

Car loadings of merchandise and miscellaneous freight increased 3639 in the week ending Aug. 19 and coal increased 2600. Total loadings of all freight were 856,219 cars as against 815,147 last year and 968,103 two years ago.

Stocks were buoyant after a reaction and bonds were irregular. Call money was firmer. Bank clearings aggregated \$5,637,969,000, a loss of 3.9 per cent from last week, but a gain of 8.4 per cent over this week last year.

past week some of the leaders have had orders already received increased, which shows that the car manufacturers have no intention of slowing production at their end of the line.

CADILLAC TO BE FILMED

WASHINGTON, Sept. 5—Something new in motion picture showing production methods in the automotive industry will be undertaken by the automotive division of the Department of Commerce in co-operation with the Cadillac Motor Car Co. The new pictures will in no wise interfere with the filming of production methods under the Department of Commerce in connection with the Studebaker Corp.

Walker Stockholders Tendered New Issue

Consists of 75,000 Shares of No
Par Common Previously
Authorized

CLEVELAND, Sept. 2—In order to increase the working capital of the company, directors of the H. J. Walker Co., maker of automobile engines, have mailed a circular letter to stockholders in which they announced that 75,000 shares of no par common stock of the company, heretofore authorized but not issued, will be offered for sale at \$5 per share.

It is stipulated that subscriptions may be made by stockholders of record of Sept. 5 at that price and the time limit of such purchases is Sept. 15, 1922. The stipulation also is made that subscriptions will be made and accepted subject to the working out of arrangements satisfactory to the board of directors, bondholders and creditors of the company and subject to the disposition of such an amount of common stock as shall be adequate to permit the resumption of operations.

The directors feel that the entire 75,000 shares should be disposed of, but it is possible that arrangements can be made which will justify the company going forward with somewhat less additional money.

Feel Confident of Success

The directors say:

Your directors feel most strongly that the stockholders preserve this company; that the possibilities for a successful and profitable business amply justify preserving it; that the present investment of the stockholders should not be lost without further effort on their part; that our plant has a capacity of 100 motors per day and that, with that production, a profit of only 10 per cent would approximate \$500,000 per year—or nearly \$3 per share on our total authorized common stock; that there is every reason to believe that a large volume of business can be secured if satisfactory arrangements can be worked out.

As to working out satisfactory arrangements with our bondholders we feel confident of success. The great majority of the creditors had agreed to accept preferred stock in payment of their claims under the original syndicate for refinancing. As you undoubtedly are aware a petition in involuntary bankruptcy was filed recently against this company by certain creditors, but, after ascertaining the status of our affairs, it was apparent to their attorneys that the creditors' interest could only be saved by the plan of re-financing here proposed and they have agreed to defer action on their petition until after our plans have been fully tried out.

ELECTRIC BODY NAMES TURNER

OLD ORCHARD, ME., Sept. 1—Earl Turner, who has been assistant secretary of the Automotive Electric Association, was to-day made manager, this being one of the final acts of the four-day summer meeting of the association held here.

Bearings Companies Will Act Separately

Joint Service Organization to Be Dissolved Last of Pres- ent Year

DETROIT, Sept. 1—The Bearings Service Co. will be dissolved as an active organization Dec. 31, 1922, according to Alfred K. Hebner, president and general manager.

The company was incorporated June 26, 1916 and has acted through 32 direct branches and approximately 1000 distributors, as the service department of the Timken Roller Bearing Co., the Hyatt Roller Bearing Co. and the New Departure Manufacturing Co. for the distribution of Timken, Hyatt and New Departure bearings.

Hebner issued the following statement:

Although the same mutually friendly attitude exists among the manufacturing principals through whose efforts the Bearings Service Co. was brought into existence, with automotive service activities and policies becoming more and more important in the industry, as they have during the past several years, there has been a growing mutual realization between the Timken Roller Bearing Co. and the General Motors Corp., whose interests have been represented in the Bearings Service Co., that the best ultimate goal would be secured by each through a separation of their bearings service program.

New Companies Formed

To this end on and after Oct. 1, 1922 the servicing of Hyatt and New Departure bearings, the manufacturers of which are units of the General Motors Corp., will be handled by the United Motors Service, Inc., and a new company to be known as The Timken Roller Bearing Sales & Service Co. will care for the servicing of Timken bearings.

Until Jan. 1, 1923 when The Timken Roller Bearing Sales & Service Company will be in operation, the Bearings Service Co. will continue the servicing of Timken bearings as heretofore at all its 32 direct Branches located in the following cities: Atlanta, Boston, Chicago, Detroit, Los Angeles, Minneapolis, New York, San Francisco, Seattle, Kansas City, Dallas, Cleveland, Denver, Indianapolis, Birmingham, Richmond, Philadelphia, St. Louis, New Orleans, Pittsburgh, Omaha, Portland, Toronto, Winnipeg, Brooklyn, Fresno, Milwaukee, Salt Lake City, Baltimore, Buffalo, Newark, Oklahoma City.

In addition in any of these cities where the United Motors Service, Inc., does not have branches the Bearings Service Co.'s branches up to Jan. 1, 1923, will sell for service Hyatt and New Departure bearings.

Friendly Position Continues

To indicate the continued mutually friendly attitude in service affairs between the manufacturers of Timken, Hyatt and New Departure bearings, the United Motors Service, Inc., will appoint as service distributors of Hyatt and New Departure bearings, the direct branches of The Timken Bearing Sales & Service Co. in cities where the United Motors Service, Inc., has no direct branches and conversely The Timken Roller Bearing Sales & Service Co. will appoint direct branches of the United Motors Service, Inc.,

Increasing Road Construction Will Tend to Bring Great Gain in Sales of Motor Trucks

By WILLIAM L. DAY

President and General Manager, General Motors Truck Co.

Detroit, Sept. 5.

FUNDAMENTAL conditions point to a good fall and winter in the motor truck business. Our own concern has just had the most prosperous August in several years and the orders on hand indicate a continuous demand. One of the noteworthy signs is that the business instead of being confined largely to the smaller capacity trucks has shown a very healthy demand for the heavier capacities.

A combination of circumstances has arisen which is greatly in favor of ever increasing sales in the heavier truck field and particularly in the tractor and trailer units. Legislation in a great many states has forced the contractor and road builder or other man engaged in heavy hauling to abandon the very heavy truck and go to the tractor and trailer unit where the weight is spread over more wheels and consequently the unit loads on the highways are less. The stresses on the tires also go down and instances have been found where in certain classes of work the tractor-trailer combination has resulted in hauling cost reductions of as much as 50 per cent.

Construction of paved highways throughout the country has been making the trailer a feasible proposition where it would otherwise have been almost impossible. Another factor which is of the utmost importance in developing the use of the trailer is in the possibilities of using greater gear reductions which help to nullify the effects of grades which have hitherto been the greatest obstacle in the path of tractor and trailer transportation.

The general business outlook of the country is now such that concerns in the transportation business feel themselves justified in investing in equipment. There is a great amount of replacement business in the truck field throughout the country just as there is in the passenger car field. With crops good and general business conditions sound there is every reason to expect that the motor truck industry will get its share of the coming prosperity. Road building is going on with increasing speed throughout the country and this alone would tend to bring a greatly increased truck business.

as its service distributors for Timken bearings in such cases.

These arrangements will result in the public obtaining as good, if not better, service on all these three bearing lines, Hyatt, Timken and New Departure, than has been available in the past through the Bearings Service Co.

General Motors May Get Pierrot's Patent Rights

DETROIT, Sept. 4—Considerable interest has been awakened in automotive engineering circles regarding the possibility of the General Motors Corp. taking over the American rights, or at least a license under the Henry Pierrot four wheel brake patents.

Pierrot arrived in this country recently in company with A. P. Sloane, Jr., it is said, and has been in conference with General Motors officials here, although nothing definite has as yet been reported on his negotiations. Pierrot is conceded to hold several key patents in the front wheel brake field and is dealing with several prominent makers in Europe at the present time on a royalty basis.

GRAY MAKING 60 CARS DAILY

DETROIT, Sept. 1—Gray Motors Corp. reached a production of 1,000 cars for the month of August. Production is now going ahead on a schedule of 60 cars a day and unless the coal shortage causes a curtailment this schedule or better is expected to be maintained all through September. Beyond a couple of hand made sample cars, there were no Gray cars nine months ago.

American Steamer Plans Awaiting Ratification

CHICAGO, Sept. 2—Terms have been agreed upon by which the American Steam Truck Co., manufacturer of the American Steamer passenger car, will take over the plant of the Duty Motor Truck Co. at Elgin, Ill. The transaction will be ratified by the stockholders of the Duty company at a meeting to be held at Elgin.

R. R. Howard, president of the American company, announced to-day that his company will move its equipment and materials from the present factory, in Chicago, to the new factory immediately after the ratification of the negotiations. The American company also has placed an order for new machinery to be used in equipping the Duty plant which was never fully equipped by the Duty company. It is expected to have the new factory ready to start production within 30 days.

The American Steamer passenger car chassis was exhibited at the Chicago Pageant of Progress from July 29 to Aug. 20, and a great deal of interest was shown in it. Some orders were taken, although the manufacturers were unable to name a definite date for delivery.

WHITE EMPLOYS NIGHT FORCE

CLEVELAND, Sept. 4—The White Motor Co., for the first time since the peak was passed months ago, is now employing a night force. More than 200 men have been hired to help out in different departments.

Directors Selected for Owen Dyneto

Reorganization of Company Completed — Continued Expansion of Activity Planned

SYRACUSE, Sept. 4—Reorganization of the Dyneto Electric Corp., which was recently purchased by Ray M. Owen of New York City, has been completed.

The new company, known as the Owen-Dyneto Electric Corp., making generators, starters and lighting equipment for automobiles, has as directors: R. M. Owen of New York City; Harry M. Ballard, Chicago; C. S. Estabrook and James D. Grant of this city. Owen is president of the new company, with Ballard and Grant, vice-presidents; Estabrook, secretary, and Grant treasurer.

Improved types of generators, starters and lighting systems have been developed at the plant since Grant took over the management for the new company. It is expected that capacity production will be possible in several months.

A generator for farm electric lighting is being developed and can be used wherever there is engine motive power. The company intends to carry out a program of continued expansion. The company has property adjacent to the plant on which additions can be erected.

Owen purchased the plant several months ago buying it for \$205,000 after creditors of the defunct concern had agreed to a system of payment of their claims.

Demand for Rolls-Royces Insures Plant Capacity

SPRINGFIELD, MASS., Sept. 5—A circular to preferred stockholders of Rolls-Royce of America, Inc., states that since the reduction in the price of the chassis in March sales have increased so fast that at present the company's unfilled orders are such as to tax the capacity of the plant for the remainder of the year.

With the present equipment the company can turn out 10 cars a week and that with a comparatively insignificant capital expenditure for equipment the output can be raised to 750 cars a year.

"On the basis of the manufacture and sale of only eight cars a week the company's net profits applicable to dividends and interest will approximate \$600,000," says the circular. "On this basis full dividends on preferred stock will be earned with a fair margin after allowing for all charges and for interest and sinking fund requirements."

CHARLES A. SINGER, JR., DIES

NEW YORK, Sept. 1—Charles A. Singer, Jr., died suddenly in a New York hospital yesterday. For several years he was prominently identified with the company manufacturing the Palmer-Singer cars, his father being president

COPPER CONSUMPTION WILL SHOW BIG GAIN

NEW YORK, Sept. 2—A survey just completed by the Copper and Brass Research Association is followed by the prediction that automobile manufacturers in the United States will consume approximately 100,000,000 lbs. of copper metal this year.

This is an increase of 30,000,000 lbs. over 1921 and about 750,000 lbs. more than in 1920, when the automobile industry consumed 7.63 per cent of the total copper production in this country. The association finds that the use of copper in automobile construction varies from 50 lbs. in some cars to 250 in others.

of the concern. The company passed out of the automobile industry six years ago, and since the end of the war Charles A. Singer, Jr., has been a member of the firm of Partridge, Singer & Baldwin, which is an exporter, specializing in the sale abroad of American cars.

Ford's Michigan Holdings Valued at \$215,415,662

LANSING, Sept. 5—The annual financial statement of the Ford Motor Co. has been filed with the Secretary of State. The statement is of June 30, 1922, at which time the company's surplus was \$289,935,296, while its holdings in the State of Michigan are valued at \$215,415,662.

The Michigan statement gives Ford's cash on hand and in the bank, \$145,985,669; plant, land, improvements, buildings, fixtures and structures, \$81,626,015; machinery, tools and equipment, \$39,531,079, and good will, \$20,517,985.

Included in the Ford statements are the returns from the Dearborn Publishing Co. and the Lincoln Motors Co. The assets of the former are listed at \$124,961, while a single item of \$250,000 cash is shown as the total asset of Lincoln Motors.

Wallace Engine Interests London General Omnibus

NEW YORK, Sept. 6—It was learned through an authoritative source here today that the London General Omnibus Co. is much interested in the Wallace engine of the Argyle single sleeve type and is building experimental engines of this type, but statements to the effect that this engine has been officially adopted in place of the Knight engine now used are said to be premature.

Agents controlling the Argyle patents in this country are understood to be negotiating with American builders of bus engines with a view to interesting them in the manufacture of engines under these patents.

Traffic Truck Plant To Run at Capacity

May Also Be Made Assembling Base of Associated Motor Industries

ST. LOUIS, Sept. 4—Will I. Ohmer, chairman of the board, and Louis Ruthenburg, president of the Associated Motor Industries, made their first visit to the Traffic Motor Truck Corp. since the local company was merged with Associated Motors.

Ohmer stated that the Traffic truck will retain its name and individuality. The plant will be pushed to its full capacity of production, with prospects that it will be greatly enlarged after the manufacturing program of Associated Motor Industries is under way.

In addition, the Traffic truck plant may be the location of one of the five assembling plants of the Associated Motor Industries. This assembling plant will not only assemble Traffic trucks, but cars made by Associated Motor Industries.

On account of the central location of St. Louis and its great distribution facilities, the St. Louis assembling plant is expected to be one of the largest units of Associated Motors. Guy C. Wilson, president, and Ted C. Brandle, vice-president of the Traffic Motor Truck Corp., will remain in office and will act as directors of Associated Motors. The Traffic truck plant is expected to maintain its present organization with the advantage of having back of it all the financial resources of the parent body.

To Ship Parts in Bulk

Traffic trucks will be assembled at the other assembling plants of the Associated Motor Industries as well as at St. Louis. It is the plan of operations to turn out as many as possible of the parts and to ship them in bulk to the various assembling units. These units will be at Boston, Indianapolis, Louisville and Oakland, Cal., in addition to the St. Louis plant.

Associated Motor Industries, while putting forth its efforts to push Traffic trucks to leadership, will continue to manufacture the other trucks now made by member companies. The Jackson four-wheel drive truck and the Old Hickory truck, made by the Kentucky Wagon Manufacturing Co. will be continued. There are several makes of cars.

Gets Wisconsin Charter

MILWAUKEE, Sept. 4—A Wisconsin charter has been granted to the Associate Motor Industries, Inc., a Delaware corporation, with principal offices at Dayton, Ohio. A Milwaukee office has been opened at 230 Grand Avenue, in charge of D. H. Davis. Of the \$40,000,000 preferred and 800,000 common shares in the capital, it is stated in the application that \$25,000 will be used in Wisconsin.

Schrader Changes Methods of Selling

Eliminates License Agreement and Price Restrictions—Policy Follows Government Suit

NEW YORK, Sept. 2.—A. Schrader's Son, Inc., manufacturer of valves, gages and other tire accessories, has changed its method of selling. Instead of marketing its products under a license agreement and certain price restrictions, it has adopted a system whereby Schrader's goods will be sold direct to tire manufacturers and jobbers or through the Schrader company's consignees who will sell at the same price as the Schrader company.

This new policy went into effect Sept. 1 and was preceded two days earlier by the Department of Justice filing a suit in the United States District Court for Eastern New York asking for a permanent injunction. The complaint charged violations of the Sherman anti-trust law. The Government found fault with the old policy, claiming the Schrader system attempted to fix prices and control resales. It charged that the policy violated the anti-trust law, in that the issuing of licenses to wholesalers, which were revocable at the will of the Schrader company, constituted a monopoly.

Regarded as Friendly Suit

In a way it was regarded in the light of a friendly suit. Some time ago, when the Department of Justice pointed out to the Schrader company that it thought the old system conflicted with the Sherman law, the Schrader people determined to make a change. This new policy of marketing its goods direct was settled upon and Sept. 1 selected as the date for putting it into effect. The Department of Justice filed the suit, however, as a sort of a precautionary measure, according to Frank M. Avery, the Schrader attorney, to prevent a possible return to the old system. This Schrader has no intention of doing, the attorney contends.

"We saw officials of the Government and agreed upon a form of decree to the entry of which the Schrader company would consent, and it was arranged to have the bill filed on or before Aug. 31 while the old agreements were still in force, so that the court would have jurisdiction," Avery said. "Immediately after Labor Day we will enter our consent to the decree, since the Schrader company cannot have any objection to the restraint of a sales agreement which it now has discarded."

RECORD FRANKLIN DRIVEAWAY

Syracuse, N. Y., Sept. 5.—Following a visit to the factory of more than 200 dealers from 24 states and Canada, there was a record driveaway of Franklin cars of the new series just announced. Representing a retail value of nearly \$7,000,-

000, there were 250 cars in the parade through the city that marked the start of the driveaway, the largest single day's movement of cars out of the plant.

From now on all cars shipped from the Franklin factory will be of the series 10 type. Franklin officials announce that the production schedule for the new car is the largest ever set by the company.

Locomobile Will Expand Its Dealer Organization

BRIDGEPORT, CONN., Sept. 5.—The reorganized Locomobile Co. of America, now headed by W. C. Durant, has issued a statement to its branches and dealers outlining its plans under the new leadership. No radical changes are contemplated either in policy or design of the product, it is stated. The Locomobile as now known, with its 48 hp. low-speed six-cylinder engine and four-speed transmission will be continued.

"In a market of unsettled prices for motor cars, it is interesting to note that the company states there is no price reduction in view, but that on the contrary an increase in price is not an improbability," says the statement. "As to the marketing of the car, the familiar policy of the company in handling its product through its own branches will be continued. This system of branch houses will be amplified by direct dealers for territory not covered by branches."

Willys-Overland Reports Biggest August in History

TOLEDO, Sept. 5.—Willys-Overland reports the biggest August in its history, shipments of 14,007 Overlands and Willys-Knights being recorded as against the previous best August of 11,718 in 1917. August, 1922, deliveries were greater than those in any single month since June, 1920.

August profits are reported to have been \$1,500,000, while the three months since the company's May 31 statement are said to have averaged \$1,000,000 a month. It is expected that the company's \$16,000,000 debt will be wiped out without interfering with current profits through the formation of a real estate company to take over the branches valued at approximately \$16,000,000.

PENCO CORP. ORGANIZED

DETROIT, Sept. 1.—All automotive products of the Penberthy Injector Co., as far as sales, advertising and market development is concerned will be handled by the Penco Corp. which has opened offices in the General Motors Bldg. this city. The Penberthy company makes several well known parts and accessories for the automotive field, notable among these being the Ball and Ball carbureter, Penberthy Re-Atomizer, Flo-meter and gasoline gage. The officers of the Penco Corp. are Homer S. Johnson, president; Ivan A. McKenna, vice-president; Charles B. Johnson, secretary, and Carl Reese, treasurer.

Seeking to Protect Hydro-United Assets

Factional Struggle Seen by Creditors—Appraisers Appointed Under Receivership

PHILADELPHIA, Sept. 2.—Benjamin F. Evans, W. W. Whiting and LeRoy Deininger have been appointed to appraise the property of the Hydro-United Tire Co. of Pottstown, Pa., for which receivers recently were appointed. They will report to the United States District Court of the Eastern District of Pennsylvania.

It is claimed by Ephraim Lederer, one of the receivers, that while he believes it possible that the plant may be operated at great financial benefit to the stockholders and creditors, he is unable to ascertain the validity of certain notes and whether certain merchandise and raw material in a warehouse, which the National Iron Bank of Pottstown claims it holds as collateral security for loans approximating \$56,000, actually has been pledged as collateral security.

This, he says, is owing to the peculiar merging of the different companies, referring to the connections of the Hydro-United. The merchandise in the warehouse, which includes more than 5000 tires and tubes, is valued at about \$90,000.

Sufficient Liquid Assets

Lederer states his belief that there are sufficient liquid assets available in the receivers' hands to settle the company's indebtedness to the National Iron Bank and others. He further asserts his belief that John W. Shorb and Jacob G. Feist are parties in a conspiracy to sell about \$100,000 bonds held as collateral security for the company and that if they do, this will entail great loss to the company. He prays for an injunction restraining note-holders from the sale of any assets of the company.

A committee representing what is alleged to be a great percentage of the creditors, headed by A. R. Atwater, requests the court for leave to intervene as a protective group, representing that a factional struggle is going on in the Hydro-United stockholders' group to obtain control of the Hydro-United assets.

Files Bankruptcy Suit Against Master Trucks

CHICAGO, Sept. 2.—A petition in bankruptcy has been filed against the Master Trucks, Inc., Chicago, by the Maremont Mfg. Co., Up-To-Date Machine Co. and the Auto Body Co., all of Chicago, claiming \$750,000 due them on goods delivered to the company.

Gesas, Epstein & Leonard, attorneys for the petitioners, claim that the Master Trucks made preference to creditors by favoring the Vacuum Oil Co. with a payment of \$500 about a month ago.

S.A.E. Will Witness Aberdeen Test Oct. 6

Later in Month Production Subjects Will Be Discussed at Detroit

NEW YORK, Sept. 2—The Society of Automotive Engineers has arranged two meetings of its members, one to be held on Friday, Oct. 6, at the Aberdeen Proving Ground, Md., and the other in Detroit, Oct. 26 and 27. The Aberdeen meeting, which has been arranged through the courtesy of the Ordnance Department of the United States Army, is for the purpose of witnessing a program of test firing and a demonstration of post-war ordnance apparatus.

Will Be Joint Meeting

Following the custom established last year this will be a joint meeting to which members of the American Society of Mechanical Engineers and of the Army Ordnance Association, in addition to members of the S. A. E., are invited. Special badges admitting members of the organizations mentioned are to be issued. Details of the program have not yet been announced, but it will start at 9:00 a. m. and continue through the day, luncheon and dinner being served to those who make advance reservations. Only citizens of the United States will be admitted.

The Detroit meeting is to be devoted entirely to consideration of automotive production subjects and will be held in an auditorium in the new General Motors Building on Grand Boulevard. There will probably be two morning sessions and two afternoons devoted to factory visits. Luncheon is to be served in a room adjacent to the meeting hall, and an informal production dinner, at which representative executives of the industry will speak on the business of the industry, is to be held on Thursday evening, Oct. 26, at a place to be announced later.

Men prominent in the production of passenger cars are co-operating in the preparation of papers for the production sessions, among them being Karl Herrmann of Studebaker, T. J. Little of Lincoln, H. C. Wills of Wills Ste. Claire and F. A. Whitten of General Motors. Members of the production staffs of Ford, Dodge Brothers and Packard are also preparing material for a symposium in which several prominent men familiar with latest production methods will join.

Novel Inspection Trips

There is expected to be consideration of manufacturing problems common to all producers, such as cutting accurate gear teeth and screw threads, production of true cylinder bores, etc. Certain outstanding developments peculiar to certain plants will also be described, and authorities on machine tools will be invited to contribute to the discussion.

Inspection trips to several plants will be arranged, and these will differ materially from ordinary factory visits in that

the routes through the plants will be selected in such a way as to avoid, as far as possible, ordinary routine methods and thus allow close inspection of the particular processes which are unusual or unique and most highly developed in the particular plant. These inspections will be conducted in each case by the production executive in charge of the plant.

Non-member production executives are invited to attend the meeting.

The annual meeting of the Society is to be held in New York City, Jan. 9-12, 1923. Papers for this meeting are already being secured.

Vincent Wins Motor Boat Race at Detroit Regatta

DETROIT, Sept. 5—By capturing three straight heats, Col. Jesse G. Vincent, vice-president of the Packard Motor Car Co., won the Gold Challenge cup race at the Detroit motor boat regatta, which was concluded on Labor Day. Vincent piloted his Packard-Chriscraft boat, which is motored with a twin-six Packard engine, with half the cylinders dismounted to make the boat eligible for the race. In the final heat Vincent traveled the 30 miles at an average of 39.8 m.p.h., after which he went a lap against time at 42.2 m.p.h., which is a world's record for displacement boats of less than 625 cu. in. displacement. Vincent's victory breaks the winning streak of Gar Wood, who had won the Gold Challenge cup five times previously.

Wood had to content himself by winning the Wood-Fisher trophy race for express cruisers with his Baby Gar II. Wood's Baby Gar 3d., driven by Kinney, won the final heat of this race at 51.75 m.p.h., a new record for displacement boats for the distance, 50 mi. The former record was 48.9 m.p.h. made by Wood himself in Friday's event.

Edsel Ford, driving his Woodfish, did 53 m.p.h. in the seventeenth lap of the big event. He was not eligible for the Wood-Fisher trophy in which he was driving because he did not compete in the previous heats.

C. A. Shaler Operates Waupun Plant Full Time

WAUPUN, WIS., Sept. 4—The C. A. Shaler Co., manufacturer of tire repair tools, equipment, vulcanizers, etc., and headlight lenses, is now operating full time in its new factory, and to handle the overflow of orders is erecting a shop addition and an office building. The original plant was destroyed by fire in March and the industry has been entirely rebuilt at an investment of more than \$350,000. The plant is employing 150 persons, the largest number in the history of the company, which was established in 1906.

The Shaler company is working an international market on vulcanizers and lenses. An export office is maintained in New York under the management of R. T. Butts and Frederick Werner.

Bordino Wins Race for 92 Cu. In. Cars

Covers 373 Miles in 4:28:38 in Event Opening New Speedway in Milan

MILAN, ITALY, Sept. 5 (*By Cable*)—The opening meet on Italy's first automobile speedway took place to-day and was a complete success. The new track which is 6.2 miles to the lap, is located within six miles of Milan, and was built by the Automobile Club of Milan, so that Italy's automobile industry may have a suitable course on which to try out cars and also promote sporting events of an international caliber.

To-day's was the first of two races scheduled for September, the other being the Italian 500 mi. Grand Prix for cars of 122 cu. in. piston displacement for which are entered 38 cars representing France, Italy, Germany, Austria and England.

The race to-day was for 91 cu. in. cars, the winner being Bordino, who competed in several California races in the United States last winter, who drove his Fiat to victory over the 373 mi. course in 4:28:38. Lampiano, Fiat, was second, in 4:34:12 3/5; Salamano, Fiat, third in 4:35:48. Ramassotto, Chiribiri, Pocher and Haiden in Austro-Daimlers were still running when the race was called off. Nine cars started.

A heavy rain fell throughout the running of the event, but no accidents were recorded. A remarkable feature of the contest was that no tire changes were made.

So well pleased are the Italians with the success of the track that the City of Milan is considering sending a national Italian team to the Indianapolis speedway race in the United States next spring.

W. F. BRADLEY.

Miller Now Constructing Racer; Body 27 in. Wide

LOS ANGELES, Aug. 29—Harry Miller, veteran builder of racing cars, has under construction at his plant here the first of two 122-cubic inch displacement engines which he expects to enter in the 1923 race at Indianapolis. The new engines will have eight cylinders all in line.

The chassis that will carry the Miller engines will have a wheelbase of 104 in., but will show a narrower frame and the body will be only 27 in. wide, accommodating a driver only. The bore of the cylinders will be 2 11/32 in. with a stroke of approximately 3 1/2 in. Although the parts will be smaller, the motor will be similar in design to that which Jimmy Murphy has used in his car this season.

The entire car will weigh about 1400 lbs. and the power plant is expected to develop from 90 to 95 horsepower. With the exception of the wheels, tires and electric units, the cars will be built complete in Miller's shop.

F. O. B. Prices Annoy Los Angeles Buyers

Complain of Quotations in Advertisements—Some Dealers Blame Factories

LOS ANGELES, Sept. 4—The public has begun to protest against the practice of Los Angeles motor car dealers advertising factory prices only. Letters have been printed in newspapers signed by motorists calling attention to the misleading information derived from the advertising. One correspondent claims he was so disgusted upon learning the difference between the advertised and delivery prices that he decided to keep his old car.

The freight differential between factory and local prices is quite high. In many instances it is more than \$200. This means that when a prospective buyer reads an advertisement and learns the advertised price is \$1,495 he learns later that the quotation means the price in Cleveland, Detroit or some other eastern manufacturing center, and in Los Angeles the car costs \$1,735 or some such figure. Many of the dealers use very large display type setting up the price and below it type of very inconspicuous size, stating "Freight and war tax extra" or "F. O. B. Detroit."

When asked why they advertised in this way, some dealers said it was because the factories will not permit them to change the prices to correspond to the actual cost delivered in Los Angeles. They admit they are caused a lot of grief by this kind of advertising, but owing to the fact that the factory usually pays a percentage of the cost of advertising they are not privileged to make the change.

Other dealers are frank enough to say that they advertise factory prices because they are so much lower than delivery prices and if they can get a prospect to look at the car and take a ride in it they don't have much difficulty in selling the freight charge, when, if they advertised actual delivery prices, the prospect might not come into the place.

Ford Special Is First In Pike's Peak Climb

DENVER, COL., Sept. 4—The winning of the Penrose trophy for the fastest time in the fourth annual Pike's Peak hill climb to-day was a surprise to the 5,000 spectators when it went to a Ford special in the less than 183 cubic inches displacement class. The driver was Noel E. Bullock and the time was 19 min. 50 4/5 sec. for the 12 2/5 mile course of 7 to 10 1/2 per cent grades and 60 curves, mostly sharp switchbacks.

Glen Schultz in an Essex and Roy W. Beavers in a Chevrolet took second and third in this small car event in 20 min. 41 sec. and 23 min. 3 2/5 seconds respectively.

The first three places in event No. 2 for up to 300 cu. in. displacement went to Harold Brinker in a Wills Sainte Claire, H. L. Chapin in a Dodge and Sam Marcus in a Haynes in 20 min. 46 seconds, 23 min. 25 4/5 sec. and 24 min. 18 4/5 sec.

A Hudson driven by King Rhiley, winner of the trophy last year, won first prize to-day in the event for cars above 300 cu. in. in 20 min. 5 sec., with a Packard driven by P. B. Abbott only two seconds behind, a Mercer piloted by W. S. Haines captured third place in this large car event in 20 min. 31 sec. Eighteen cars started and 15 finished, three being forced out by slight breakages, but there were no serious accidents.

All three events were for non-stock cars, with \$2,100 in cash prizes divided into firsts and seconds of \$500 and \$200 for each event.

Kelly Truck Directors Get Optimistic Reports

SPRINGFIELD, OHIO, Sept. 5—That there is a general business revival in sight and that prospects are bright for the sale of motor trucks this fall, was the announcement made here by President Charles Willard Young, of the Kelly-Springfield Motor Truck Co. following a dinner which he gave at Hotel Shawnee for the Springfield directors. Young said the company is now employing 300 men, which is about 50 per cent of normal.

Reports from various parts of the United States, even the far west, show that business men, manufacturers and farmers are ready to buy motor trucks, Young said. He is optimistic about the future.

The Kelly company is aiming to standardize its motor trucks and is re-organizing its sales force throughout the United States preparatory to the anticipated rush of business this fall and winter. Hopes are entertained that it will not be long before the big plant will be working with a normal or above normal force. During the war period 1100 men were employed.

In addition to Young those at the dinner were: B. J. Westcott, J. Elden Bowman, E. S. Kelly, James L. Geddes, P. H. Diehl and Grayson Lathrop, all directors; and F. H. Pietsch, sales manager and acting general manager.

Geddes, chairman of the board, who was critically ill for several months, is now fully recovered and is at the plant daily.

CARLOAD OF DURANTS SHIPPED

OAKLAND, CAL., Sept. 5—The first carload of automobiles built at the new plant of the Durant Motor Co. here was shipped to Seattle late last month to W. S. Dulmage, distributor of the Durant car in the State of Washington. Officials of the Durant company were present at the loading of the first car. Following this first shipment, sixteen more carloads of Durants were shipped to Dulmage for distribution in his territory.

Cotton Crop Brings South Tractor Hope

Branch Managers Say That Outlook Is Best Since Summer Three Years Ago

ATLANTA, Sept. 4—According to reports early this month from several southern managers of tractor and power farming equipment manufacturers, many of whom have southern offices in Atlanta, tractor sales during the past sixty days were about 60 to 70 per cent better than during the spring months.

The outlook, these managers say, is many times better than it has been since the summer of 1919, and most of them are looking forward to the biggest volume of business in tractor sales during the next six months the industry has ever experienced in this section. They base this prediction on daily reports received the last two or three weeks from field men over the entire district, who declare that the southeastern farmers are in better shape financially than they have been in more than three years.

This year's cotton crop estimated at well over 10,000,000 bales, will bring the growers millions of dollars, the farmers making a real profit from cotton for the first time since the war. While much of this money will be needed to liquidate their debts, enough will be left to enable the farmers to buy such equipment as they need. Dealers throughout the section are advising the Atlanta branch managers that they have three to four times as many live prospects for tractor sales as they had a year ago, and ten times as many as two years ago.

Georgia and South Carolina are expected to be the only two states in the Southeast where power equipment sales will not boom during the next six months; business in these states is expected to be below normal due to the failure of the cotton crops.

New Jersey Sales, 5672 in July; 7450 in June

NEW YORK, Sept. 6—July registrations of new automobiles and commercial cars in 21 counties of New Jersey showed a decline from the previous three months, during which there had been a consistent gain. Sherlock & Arnold, hitherto confining its sales analysis to counties in and around New York, has branched out into New Jersey and is publishing the New Jersey Automobile Sales Analysis, starting its compilation with April of this year. July sales aggregated 5672 automobiles as against 7450 in June. The re-capitulation for the four months gives a total of 26,310 new cars and 5437 commercial cars.

In April there were five cars registering over the 600 mark with the rest running some distance behind. The following month saw four over the 500

(Continued on page 495)

Milwaukee Awaiting Greater Coal Supply

**Production Schedules May Be
Curtailed Month Hence Un-
less Relief Comes**

MILWAUKEE, Sept. 4—With orders on the books which will occupy normal capacity at least until Dec. 31 and, in some cases, past Feb. 1, 1923, manufacturers of automotive parts and equipment are in a comfortable position in respect to business, but the fuel situation remains alarming, and no appreciable relief has been felt as yet as the result of the resumption of mining.

The larger plants maintain their own power plants, but a great many automotive equipment and parts shops use central station current. Industries generating their own power are only one step worse off than the public utilities, both feeling the shortage of steam coal very seriously. The principal source of central station current derives a part of its supply from hydroelectric plants, but the bulk is generated from steam locally. No curtailment of supply has been made so far, but it is likely that in four to six weeks, unless the coal supply is greatly improved, some sort of rationing or other economies will have to be invoked.

Rail Shipments Limited

Although mining has been resumed, the railroad strike situation has choked up the movement. Milwaukee's supply comes largely by Great Lakes vessels from Lake Erie ports, but the movement of coal from mines by rail to those ports is still limited.

It is difficult to get definite statements from manufacturers upon their present coal supplies and prospects for the fall and winter. However, the local situation may best be described by the fact that while on Sept. 1, 1921, a total of 4,000,000 tons had been placed on Milwaukee docks during the season, this year only 1,000,000 tons have arrived. Therefore, if a normal supply is to be furnished Milwaukee for local, State and Northwest needs, 500 boatloads of an average of 6000 tons each would have to come up the lakes between now and the close of navigation, about Dec. 1. This is regarded as an impossibility. Until the railroad strike is dissolved, little help from rail shipment of coal from mines to Milwaukee is possible.

Inland Manufacturers Worse Off

Manufacturers in the interior of Wisconsin are worse pressed than Milwaukee, for coal consumers usually look to Milwaukee for supplies. Other receiving ports are Sheboygan, Manitowoc, Green Bay and Superior, but docks at these points are relatively as bare as those in Milwaukee.

In the northern and western sections of Wisconsin, hydroelectric power is abundant, and many industries either are

RAW CRUDE OIL USED IN TRACTOR ENGINE

JANESVILLE, WIS., Sept. 4—Crude oil in its raw state, as it gushes from the ground, was successfully used as fuel in a kerosene tractor engine by the Townsend Manufacturing Co., in special tests made during the past week. The oil came from a well in Montana owned by Janesville capital. It differs from the Texas crude in that it resembles ordinary lubricating oil in color and consistency.

The Townsend engine operated as well, judging by all appearances, as it does on kerosene fuel. Further tests will be made before the Townsend tractor is put forth as adapted to crude oil. Work along this line has been going on in the experimental shops for a year or longer, it being recognized that crude oil use represents a large economy over kerosene or gasoline. The average crude can be purchased for 3 to 4 cents per gallon, while kerosene is selling at 16 to 18 cents per gallon.

purchasing such power or intend to do so. It is true, however, that the hydroelectric power companies are pretty well sold up right now, and any material increase in the supply must await new power plant construction and building of new transmission lines, which require large investments and much time.

At this moment, no industry, so far as can be ascertained, is in danger of having to close down for lack of fuel or current, but a month hence it is probable that operating schedules will have to be reduced unless broad relief comes. Automotive manufacturers take an optimistic view of the future, despite the critical condition of the power supply.

Best Week Locally

So far as the effect of the railroad situation is concerned, motor transport is relieving the strain so far as short hauls are involved, and it is gradually being extended to meet heavier needs. On the whole, however, railroads, are doing well in the handling both of incoming raw and semi-finished materials and outgoing finished products. It is a struggle to get cars and delays are frequent in transit, but there is consolation in the recalling of wartime memories, when things were a great deal worse.

The past week was one of the best this year regarding both distributors' and dealers' business in Milwaukee. This was due to the genuine stimulation of the big motor show in conjunction with the annual Wisconsin State Fair, held in West Allis, a suburb of Milwaukee. Hundreds of dealers from all parts of Wisconsin and Upper Michigan, the Milwaukee distributing territory, came to Mil-

(Continued on page 495)

Fleet Owners Report Gain During Strike

**Bus Operators, Too, Feel Spurt—
No Abatement in Progress
Expected**

CHICAGO, Sept. 2—Motor truck fleet owners and passenger bus operators in and around Chicago have experienced a decided spurt in business since the railroad shop men's strike was called, and it is thought by a majority of these men that the present high mark in their lines will not be abated by the return to work of the strikers.

Short hauls to neighboring towns via the motor truck have grown more popular, and passenger buses have been busy all summer running into the resorts of Indiana. Preparations are now being made to continue this interurban service throughout the winter, and more trucks are to be added within the next few weeks.

Merchants in Hammond, Gary, Miller and other towns in Indiana are now receiving and sending much of their goods by truck. Between Kankakee, Aurora, Batavia and towns in the Fox River Valley, a truck service has grown within two years from a single-man job to a corporation employing fifty people and 15 trucks. Garages are maintained by these people in Chicago, Aurora and Kankakee.

Fleet owners in Chicago, that is those who rent out their vehicles, say that, although the year started out poorly, business has grown in leaps and bounds within the last month until now, practically every truck in their garages sees at least eight hours service every day.

Increased Steel Wages Make Birmingham Boom

BIRMINGHAM, ALA., Sept. 1—Shipments of automobiles into the Birmingham district were received more promptly the past week than during the month previous. A number of concerns stated that they had received cars and others that notices indicated early deliveries.

The recent announcement of the United Steel Corp. of a 20 per cent increase in the pay of common labor, followed by the announcement of the coal operators of Alabama that they would do likewise and then by several of the independent furnace and iron concerns stating that their increase would be effective the same date has affected about 50,000 men in Birmingham directly and caused the entire city to put on "boom" optimism.

Philadelphia Demand Good

PHILADELPHIA, Sept. 2—Automobile dealers generally report a good demand for all classes of cars, the trend being toward closed models. Prices are still on the decline, which evidently is an aid in stimulating the demand.

Men of the Industry and What They Are Doing

Templar Appoints Chestnutt

Ralph C. Chestnutt has been appointed chief engineer of the Templar Motors Co. at Cleveland.

Hyman Named Stutz Ad Head

Herbert R. Hyman has been appointed advertising manager of the Stutz Motor Car Co. of America, now under control of Charles M. Schwab. Hyman comes from the Charles H. Fuller Co., the advertising agency which handles the Stutz account. Before that connection he had been a prominent executive of the Cole Motor Car Co. for many years. This most recent change brings him back to his old home, Indianapolis.

Brennan Manages Inland Sales

B. G. Brennan has been appointed general sales manager of the Inland Products Co., manufacturer of the Inland Spiral-Cut and Oilless piston rings. Brennan has had a wide experience in merchandising and advertising and will devote his time to the sales development of the complete Inland line.

King Appoints Graham

The King Motor Car Co. has appointed C. L. Graham factory superintendent. Graham has been connected with the automotive industry for many years, serving in a similar position with the General Motors Corp. in Flint for four years and later going to Alma, Mich., as production manager of the Republic Truck Co.

American Piston Makes Changes

The American Hammered Piston Ring Co. announces the appointment of Joseph S. Jacobs as secretary and assistant treasurer. Jacobs joined the company in sales promotion work in 1919, when it was purchased by the Bartlett Hayward Co. and moved to Baltimore. Later he became manager of the sales promotion department, and a year later was appointed advertising manager. C. B. Cook, former assistant, succeeds Jacobs as advertising manager. He came to the company two years ago from the staff of the Baltimore Sun. C. A. Grainger has been made assistant general sales manager to succeed Thomas B. Blakiston, who now is general sales manager. For the past year and half Grainger has been district sales manager for the company in the Gulf States district.

Weaver Leaves Star Rubber

O. L. ("Buck") Weaver has retired from active association in the Star Rubber Co. He first left the company on June 1, 1921, due to ill health, but returned on March 1 of this year. He has been a large factor in the Star since its reorganization in 1916, acting first as its secretary, and later as its vice-president. During the war he spent considerable

time in Washington in the interests of the smaller factories with the War Industries Board, was later in the Motor Transport Corp. work, and subsequently a member of the executive committee of the tire division of the Rubber Association. He entered the industry in 1899, first with Diamond, and later served with Goodyear for 10 years. He represented Pierce Arrow for five years in northeastern Ohio. His future plans are incomplete, but his efforts will doubtless be continued in the automotive field.

Black & Decker Promotes Allen

W. C. Allen, who has been in charge of the Chicago branch of the Black & Decker Manufacturing Co. for the last year, has been appointed sales supervisor for the company. In order to release Allen for his new work, R. S. Mitten has been appointed Chicago branch manager. Mitten formerly served as sales manager of the Electric Appliance Co., Chicago.

Talbott Goes with Virginia Rubber

Frank Talbott, who was formerly general manager of the Victor Rubber Co., has been appointed general manager of the Virginia Rubber Co., with headquarters at Charleston, W. Va. Since leaving the Victor, Talbott has been directing the manufacture and sales end of a new tire he has invented. It is announced that the tire will be manufactured at the Virginia plant instead of at Cleveland.

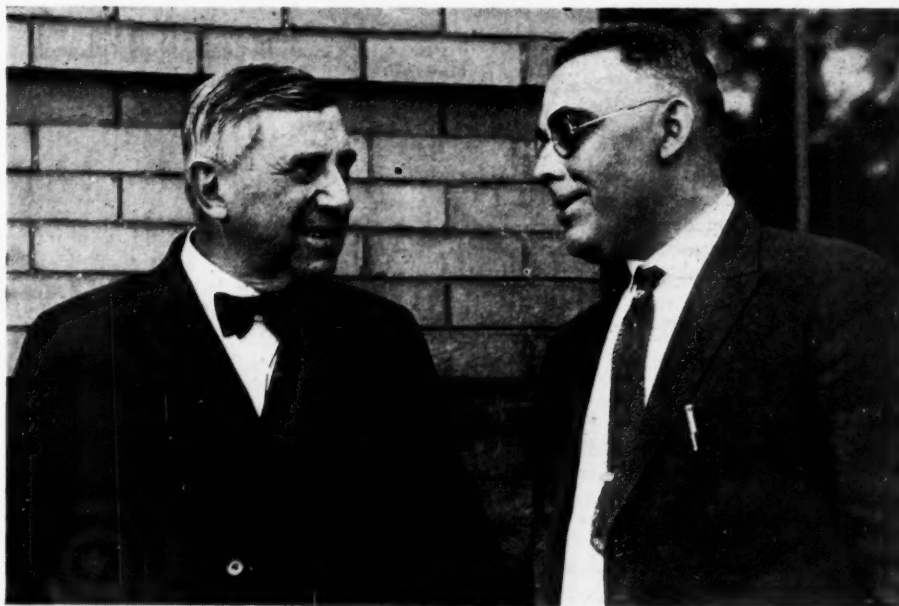
Maxwell Announces Changes

E. A. Nelson has been appointed chief engineer in charge of the work of all engineering branches of the Maxwell Motor Corp. Clyde Sauzedde has been appointed assistant chief engineer in charge of the designing department having supervision over chassis, body and equipment designing, while H. E. Maynard has been appointed assistant chief engineer in charge of all the technical sections of the department. John Squires has been made assistant to the chief engineer in charge of the administrative work in the department. Nelson is well known through the industry for his connections with the Hupp Motor Car Co. over a period of years and afterward for the manufacture of his own product. Sauzedde has been with General Motors, Studebaker and Dodge Brothers, being one of the original engineers with the latter organization. Maynard has come up through the Maxwell organization.

Yates with Interstate Forge

Robert C. Yates, for many years identified with the Union Drop Forge Co. of Chicago, has resigned to become general manager of the Interstate Drop Forge Co. of Milwaukee. Yates, after graduating from Union College, was connected with the American Locomotive Co. at Schenectady, N. Y., and Bethlehem Steel Co., having been manager of the Chicago district office for Bethlehem prior to his connection with Union.

Industry's Newest Acquisition



To commemorate his debut into the automotive industry, Charles M. Schwab, after acquiring control of the Stutz property in Indianapolis, faced the camera with W. N. Thompson (right), president and general manager of the Stutz Motor Car Co. of America, Inc. Schwab reiterates his statement that the Stutz plant will be operated as an individual and independent industrial unit and that he will be active in the management from now on.

Detroit Has 2 Weeks Coal Supply on Hand

**More Fuel Coming in—Power
Has Not Yet Been Curtailed—
Ford's Plans Unchanged**

DETROIT, Sept. 5—Although the movement of coal is improving, the Detroit supply is one step nearer the curtailment period than it was a week ago. At that time the Detroit Edison Co., which is the dominating factor in the power requirements for this zone, had on hand an 18 days' supply. This has now been reduced to about 14 days, and the Labor Day holiday will cut this down somewhat more. On the other hand, whereas a week ago only 50 per cent of the requirements of the daily consumption was coming in per day, this has moved up to about two-thirds of daily consumption.

According to Alex Dow, president of the Detroit Edison Co., the fuel situation is skirting the edges of trouble and will probably continue to do so all winter as the longer days and the demands for light and heat will soon begin to boost the requirements.

Rail Situation Bad

The situation with the Louisville & Nashville roads is very bad, and along the Chesapeake & Ohio roads not very much better. The N. & W. is said by Dow to be doing creditably.

When asked to what extent he would let the Detroit Edison supply of coal get down before a curtailment order would be issued, Dow stated that this would depend on weather conditions and upon the possibilities of coal coming in. He stated that he could not let the supply get very much lower without issuing a curtailment order, and if he had to do so, he realized it would have a very serious effect on the automotive industries, as the primary requirements would have to go to public utilities.

So far as stocks of coal for plant heating, compressed air, hammer rooms, boiler rooms and other special requirements are concerned, none of the factories are as yet worried seriously regarding the situation, as practically all have a supply on hand for 30 days or more, and it is felt by that time the coal supply will be materially augmented.

No Change with Ford

DETROIT, Sept. 6—Plans of the Ford Motor Co. for closing Sept. 16 because of fuel shortage are unchanged. Conferences of executives on the company's manufacturing policy are being held regularly, but as yet there has been no statement forthcoming.

Among other things considered is a plan for operating at all times on a scale that will enable parts to be turned out in sufficient quantity to keep all cars now on the market in operation.

The sales department will not attempt to formulate special plans for meeting the unusual situation, but will simply

ship all cars as long as they hold out, according to priority of shipping requirements. Orders received after these are all gone will be taken subject to delivery when the factory reopens, and will be shipped in the order in which they are received.

The tractor plant at River Rouge closed 10 days ago to divert all available power to the car factory at Highland Park. In addition to the power received from the River Rouge power house which operates with coal fuel, the Highland Park plant is also burning oil and tar, and is getting a part of its power from Detroit Edison. Ordinarily the power from the latter source is about 25 per cent of requirements. Oil and tar used approximates 90,000 barrels daily.

Ford production in August aggregated 136,000 in the plants located in the United States.

Four New Sport Models Added to Haynes Line

KOKOMO, IND., Sept. 6—Four new sport models have been added to the Haynes line for 1923. These consist of a five passenger sport phaeton, two passenger sport roadster, three passenger sport coupe and a five passenger sport sedan.

The cars are finished in maroon and have de luxe equipment, including six disk wheels, polished protection bars on the back of the body, front and rear bumpers, nickel plated radiator, ornamental radiator cap and headlamps, Motometer, windshield wings on open models, sunshade, etc.

These sport bodies are mounted on the 121 in. wheelbase Model 55 chassis. Individual steps are standard equipment. The fenders are crowned higher than before.

The list prices of the new models are: 5-passenger sport phaeton, \$1,895; 7-passenger sport roadster, \$1,895; 3-passenger sport coupelet, \$2,195; 5-passenger sport sedan, \$2,695.

22,000 Pounds, Limit California May Adopt

SACRAMENTO, Sept. 5—A gasoline tax of two cents a gallon, more rigid policing of the state highways, weight limit of 22,000 pounds for loaded trucks, and a graduated weight tax on all kinds of automotive vehicles, in addition to the present license fee based on horsepower, will be asked of the California State Legislature at its next session this fall, according to Drury Butler, chairman of the Highway Legislative Committee of the County Surveyors' Association of California.

RUBBER PLAN FAILS

NEW YORK, Sept. 5—According to cable advices received here failure has attended the efforts of the committee appointed by the British and Dutch governments to formulate a plan for the restriction of rubber production and the arrangements are declared ended.

Ford's Closing Order Hits Goodyear Plant

**Curtails Production — Firestone
Will Catch Up with Orders
on Other Types**

AKRON, Sept. 5—Following the announcement of Henry Ford that he would close his entire plant on Sept. 16, due to the coal situation, the Goodyear Tire & Rubber Co. has curtailed production of Ford automobile tires by nearly 30 per cent. Goodyear has been making between 6000 and 8000 tires a day for Ford at plant No. 2 in Akron.

Under the new schedule now in effect, plant No. 2 drops from a five and a half day week to a four day week, thereby cutting 36 hours off the week's working time and reducing production by approximately 28 per cent. No change is made in production in any other tire or mechanical goods departments at Goodyear.

The Goodyear reduced output program on Ford tires will continue until the Ford plants re-open and until Henry Ford again begins to order tires extensively, Goodyear officials state.

Well Fixed for Coal

No other Akron company has altered its production program on account of the contemplated Ford shutdown. The Firestone Tire & Rubber Co., making more tires for Ford than any other rubber company, announces that a diminished demand for Ford sized tires for original equipment will enable the company to catch up with orders on other types and sizes of tires.

Practically all Akron companies are well fixed as to coal. A majority receive the bulk of their electrical power from the Northern Ohio Traction & Light Co., which has a 60 day supply of coal on hand and several hundred cars in transit. In addition to this power, Akron rubber factories combined burn about 100 cars of coal a day in generating steam for their vulcanizing departments. All have coal on hand. Firestone recently secured nearly 500 cars. Goodyear has its own mines in southern Ohio.

Ford Reinstates Order Calling for Rubber Mats

SPRINGFIELD, OHIO, Sept. 4—The Victor Rubber Co. received a telegram from the Ford Motor Co. Saturday reinstating an order for rubber mats which was rescinded when Ford announced he would close his plants on Sept. 16 rather than pay the price demanded for coal.

Treasurer H. H. Durr in speaking of the re-instatement of the order said that only a moderate delivery of mats will be made this month.

Ford's representatives are out now endeavoring to get an adequate supply from privately owned coal companies. They were in Springfield a few days ago on their way to Kentucky and other points in the south.

August Tire Output Equals That of July

Production Approximated 2,750,000 in Akron District—
Busy Fall Expected

AKRON, Sept. 4—Tire production in August was practically abreast that of July in the Akron district when new output records were established, and manufacturers here look for busy times during September and October.

While some tire companies here decreased production slightly during August, others swelled their daily output, thus more than balancing the decreases and giving August a record of approximately 2,750,000 tires in the Akron district, or about the same as July's production. These marks are above any others ever set in the tire industry, not even excepting the unusual period of business in early 1920, just before the automotive slump came.

Bumper crops mean bumper business for automobile and tire manufacturers, say Akron tire builders. Farmers are getting good money for their crops, and their successful season will reflect itself in stimulated sales of both automobiles and tires, and manufacturers here are planning to meet heavy demands from dealers in the middle and western agricultural states.

Consumer Sales Break Records

While the demand for tires for original equipment has declined somewhat, due to retrenched activities upon the part of automobile manufacturers in view of the coal situation, consumer sales of tires have broken all previous records and all Akron manufacturers report unprecedented dealer activity in all parts of the country.

Practically every company in Akron faces September and October business buoyantly and optimistically and with every anticipation of record breaking business. November and December will see diminished sales, these months constituting the usual dull tire season, but January will see early resumption of orders from dealers for 1923 spring trade, and Akron manufacturers already are laying plans for another record-breaking production next year.

Milwaukee Awaiting Greater Coal Supply

(Continued from page 492)

waukee, many of them bringing prospects who desired to see the 1923 models before placing orders. Local buyers who have been waiting to view the field before placing orders found opportunity of ample dimensions at the State Fair show to see practically every passenger car built in America in its new types.

The results of this year's State Fair show were eminently satisfactory, especially as it appears that the farmers are

again becoming a buying factor, both in passenger and commercial cars. Exhibitors of farm machinery said that tractors and power operating equipment aroused more interest than in 1920 or 1921, and some actual sales were made on the grounds.

Upstate dealers said that there was a slowing up in demand in cities, but rural districts were producing some good business in passenger cars especially. April, May and June of this year represent probably the biggest and best selling period on record. July showed a falling off which was relieved to some extent in August by price reductions and the appearance of 1923 models. September is looked upon to produce a healthy volume. Closed types are running strong in the sales ratio, and if deliveries were quicker, probably more would be sold. A great many buyers do not want to wait anywhere from 30 to 90 days before the car is placed in their hands.

New Jersey Sales 5672 in July; 7450 in June

(Continued from page 491)

mark, some distance setting apart the last in that group from the next highest. The same ratio obtained in June but in July there were only two cars exceeding that figure.

The registration figures follow:

	Automobiles	Commercial Cars
April	6,535	1,257
May	6,653	1,478
June	7,450	1,517
July	5,672	1,185
Total	26,310	5,437

Los Angeles Car Demand Showing Little Decline

LOS ANGELES, Sept. 5—This month is showing very little diminution in the demand for motor vehicles. Sales are running somewhat behind those of July, but this is customary during August. Several dealers cannot make deliveries and that is another reason for the falling off in sales. These dealers claim they get no encouragement from the factories and at least two firms claim to be from thirty to sixty days behind their orders.

Unless every indication fails, this year will prove the biggest on record in Southern California. Dealers in the surrounding small towns again are active and there is a marked demand for representation, especially among the better known lines of passenger cars.

Through the organization of finance companies, dealers are finding it easier to get their time payment paper handled. The banks are showing no particular desire to lend their money, but it is a known fact that the very banks which have refused to accommodate the dealers have organized and financed funding companies which serve the purpose but absolve the banks direct from the risk and are able to charge a higher rate of interest.

Casing Total in July Reached 2,476,636

Production Shows Decline of
93,888 from Year Ago—
Tubes Increased

NEW YORK, Sept. 5—The monthly report of the Rubber Association of America, compiled for the Bureau of Foreign and Domestic Commerce, shows that July, 1922, produced 2,476,636 casings, a decrease of 93,888 from July of last year. The production of tubes for these comparative months was about the same, this July showing an increase of 7218.

The report follows:

PNEUMATIC CASINGS				
	No. Mfrs. Reporting	Inventories	Production	Shipments
1921—				
Jan. ...	45	5,319,605	703,430	965,417
Feb. ...	45	5,193,018	819,892	1,073,756
March ...	46	4,597,103	1,163,314	1,614,651
April ...	49	4,527,445	1,651,418	1,785,951
May ...	59	4,451,668	2,100,917	2,085,882
June ...	63	4,154,456	2,313,265	2,643,850
July ...	63	3,892,037	2,570,524	2,757,581

1922—				
Jan. ...	66	4,174,000	2,055,000	1,597,000
Feb. ...	66	4,691,000	2,084,000	1,562,000
March ...	63	5,183,286	2,645,790	2,073,963
April ...	65	5,464,336	2,401,187	2,086,651
May ...	65	5,523,095	2,721,503	2,639,273
June ...	64	5,042,147	2,838,890	3,133,260
July ...	63	4,834,106	2,476,636	2,695,095

INNER TUBES				
	No. Mfrs. Reporting	Inventories	Production	Shipments
1921—				
Jan. ...	47	5,586,163	740,824	1,042,617
Feb. ...	46	5,415,464	916,627	1,129,881
March ...	48	5,044,861	1,346,483	1,643,690
April ...	51	4,916,772	1,762,122	1,983,571
May ...	57	4,751,880	2,210,040	2,342,567
June ...	60	3,835,098	2,359,928	3,232,673
July ...	61	3,122,815	3,020,981	3,603,248

1922—				
Jan. ...	66	5,247,000	2,343,000	1,890,000
Feb. ...	65	6,142,000	2,597,000	1,703,000
March ...	63	6,991,118	3,017,511	2,090,737
April ...	65	7,230,096	2,650,573	2,329,343
May ...	65	7,189,552	2,970,696	2,938,947
June ...	64	6,186,534	3,130,629	3,973,679
July ...	63	5,675,839	3,068,199	3,630,744

SOLID TIRES				
	No. Mfrs. Reporting	Inventories	Production	Shipments
1921—				
Jan. ...	12	303,753	21,220	29,116
Feb. ...	12	304,374	23,365	29,599
March ...	12	283,800	27,710	43,926
April ...	12	269,985	28,859	42,080
May ...	12	264,663	35,156	40,122
June ...	11	240,336	28,395	49,867
July ...	11	220,003	35,123	55,678

1922—				
Jan. ...	11	182,000	40,000	33,000
Feb. ...	11	183,000	39,000	37,000
March ...	11	182,197	49,433	48,350
April ...	11	173,748	46,664	52,309
May ...	11	170,904	57,640	60,711
June ...	11	169,808	66,089	63,408
July ...	11	176,375	71,505	60,425

Explanation

"Production" and "Shipments" figures cover the entire month for which each report is made. "Inventory" is reported as of the last day of each month.

"Inventory" includes tires and tubes constituting domestic work in factory and in transit to, or at warehouses, branches (if any), or in possession of dealers on consignment basis, and as a total represents all tires and tubes still owned by manufacturers as a domestic stock.

"Shipments" includes only stock forwarded to a purchaser and does not include stock forwarded to a warehouse, branch, or on a consignment basis, or abroad.

Automotive Exports Keep at High Level

Expected Decline in Shipments from June Reported by Depart- ment of Commerce

WASHINGTON, Sept. 5—The export shipment of American automotive products continued at a high level during July, although an expected decline was recorded from the large shipments made in the previous month of June. This was shown to-day by the Automotive Division of the Bureau of Foreign and Domestic Commerce which announced the export sales made in July of automotive equipment from the United States, following the announcement of the Canadian shipments for the same period a week ago.

Details of the United States trade are given in the table adjoining but a capitulation of the totals shows the shipment of 5600 passenger cars, valued at \$4,395,541; 822 trucks valued at \$734,148; parts (not including engines and tires) to the extent of \$2,825,335; and 965 motorcycles having a value of \$267,220. The Canadian shipments for July were previously announced as 2812 passenger cars and 211 motor trucks, giving a total trade in these two items of 8412 cars and 1033 trucks. The comparison with June is:

	Cars	Trucks
July	8,412	1,033
June	10,085	1,291

This decline, although small, is the first recorded since the summer of 1921, when the low point in international trade was reached on both these two items. Month by month, until July, the curve has been upward, reaching its highest point during June. The drop in July is explained as being seasonal, due to the fact that shipments to the countries south of the equator, then in the midst of their winter season, necessarily were at a lower rate.

These countries are expected to return to the buying column in late August or September, in conjunction with their spring, and, although shipments will slack up to the northern half of the world, a continuing high level is to be looked for, it is thought by those closely in touch with the developing demand for automotive products abroad.

Courier Motors Reports Many Orders for New Car

SANDUSKY, OHIO, Sept. 5—The Courier Motors Co., which, under its previous name, the Arrow Motors Co., acquired the assets of Maibohm Motors Co., reports that production is under way on six-cylinder models, which are custom built and painted. It is stated that enough orders are on hand for the "Courier" to keep the plants at capacity for several months.

The officers of the company are: President, A. C. Burch, formerly vice-president and director of sales of the Clydes-

United States Exports, Imports and Reimports of Automotive Products for July, 1922, and for Nine Months That Preceded

	EXPORTS					
	Month of July 1921		Month of July 1922		Nine Months Ending July 31 1921	
	No.	Value	No.	Value	No.	Value
Automobiles, including chassis	2,563	\$2,187,605	6,451	\$5,165,643	24,558	\$30,041,421
Electric trucks and passenger cars	.....	.....	29	35,954	.....	198
Motor trucks and buses, except electric	339	314,237	552	199,721	5,092	7,798,907
Up to 1 ton	.....	.....	.....	.....	.....	3,837
Over 1 and up to 2 1/2 ton	.....	.....	186	288,190	.....	1,220
Over 2 1/2 ton	.....	.....	84	246,207	.....	467
Total Motor trucks and buses, except electric	339	314,237	822	734,148	5,092	7,798,907
Passenger cars, except electric	2,224	1,873,368	.....	.....	19,466	22,242,514
Value up to \$800	.....	.....	3,568	1,778,995	.....	23,200
Value over \$800 and up to \$2,000	.....	.....	1,837	2,070,316	.....	12,254
Value over \$2,000	.....	.....	195	546,230	.....	1,186
Total passenger cars, except electric	2,224	1,873,368	5,600	4,395,541	19,466	22,242,514
Parts, except engines and tires	.....	1,952,525	11,791,538	2,825,335	.....	26,768,707
Accessories, parts of	.....	.....	.....	.....	.....	92,999,156
Station and warehouse motor trucks	5	5,397	9	11,887	268	194,797
Trailers	.....	.....	27	15,300	.....	104
Airplanes	.....	.....	7	28,300	30	193,775
Parts of airplanes, except engines and tires	.....	2,444	.....	.....	.....	293
Bicycles and Tricycles	.....	100,594	790	11,256	.....	32
Motorcycles	441	124,523	965	267,220	8,398	108,106
Parts, except tires	.....	.....	176,448	100,729	.....	134,738
Gas engines	40	7,513	487	86,191	733	58,130
Traction engines, (steam) except agricultural	.....	.....	1	950	65	.....
Automobile engines	415	108,472	4,608	551,129	5,812	98,340
Aircraft engines	.....	.....	3	6,190	.....	21
Complete tractors, except agricultural	17	29,990	1	525	5,090	33,975
Other internal combustion engines	251	83,534	266	36,743	5,898	3,773,086
Imports	45	90,532	37	72,438	290	95
Parts, except tires	.....	72,253	.....	31,208	.....	54,600
All other	.....	7,183	.....	16,472	.....	46
Reimports	893	1,174,065	102	144,510	2,445	70,612
Automobiles (free of duty)	.....	.....	.....	.....	.....	.....
*Pounds.	.....	.....	.....	.....	.....	.....

dale Motor Truck Co.; vice-president, O. O. Brace, president of the Sandusky Nut Co.; treasurer, E. E. Ernst; secretary and general counsel, J. G. Pyle; directors, E. G. Kirby, vice-president of the Commerce-Guardian Trust & Savings Bank, Toledo; R. E. Hayslett, treasurer of the Hydraulic Steel Co., Cleveland, and N. T. Brotherton, of the Brotherton Co., Detroit.

SAFETY MEETING PLANNED

CHICAGO, Sept. 2—A conference of highway commissioners, railroad officials and presidents of automobile clubs in Illinois has been called by the Illinois Commerce Commission to meet at Springfield Sept. 30 to plan a campaign for the purpose of reducing the number of accidents to automobiles at railroad crossings.

M.A.M.A. Completes Convention Plans

Meeting Will Be Opened Sept. 13
by President E. H. Broadwell
—Long List of Speakers

NEW YORK, Sept. 5—Plans have been completed for the sixth annual credit convention of the Motor and Accessory Manufacturers Association which will be held Sept. 13-15 at Hotel Lafayette, Buffalo. In connection with the credit convention there will be special conferences on advertising, export and traffic which will be addressed by speakers of national prominence. It is to be the greatest convention effort ever made by the association.

The convention will be opened on Wednesday afternoon by President E. H. Broadwell and the speakers will include M. L. Heminway, general manager M. A. M. A.; C. A. Burrell, manager credit department of the M. A. M. A., and Merryle Stanley Rukeyser, financial and business editor New York *Tribune*. The discussion of their papers will be led by I. K. Schnaitter, assistant secretary-treasurer of the Willard Storage Battery Co. The association dinner will be held in the evening.

Credit Convention on Thursday

Thursday will be the big day. The credit convention will be addressed by R. E. Hayslett, treasurer, Hydraulic Steel Co.; Alfred Reeves, general manager, National Automobile Chamber of Commerce; C. A. Dana, president, Spicer Manufacturing Corp.; T. M. Simpson, credit manager, Continental Motors Corp.; and T. E. Challenger, credit manager, McCord Manufacturing Co.

Speakers for the advertising managers' council include Ezra W. Clark, advertising manager, Clark Equipment Co.; Harry Tipper, business manager, Automotive Industries; C. A. Musselman, vice-president Chilton Co.; Frank N. Sim, advertising manager, Timken-Detroit Axle Co.; John C. Long, secretary educational department, National Automobile Chamber of Commerce; Walter Bermingham, automobile editor, Chicago Evening Post; James C. Dalton, editor, Automotive Industries; R. E. McKenzie, advertising manager, Timken Roller Bearing Co.; William P. Green, director, National Vigilance Committee Associated Advertising Clubs of the World; Maurice Switzer, vice-president, Kelly-Springfield Tire Co.; J. C. McQuiston, publicity manager, Westinghouse Electric & Manufacturing Co., and S. E. Baldwin, advertising manager, Willard Storage Battery Co.

Speakers at Export Meeting

The export managers will listen to S. W. Dorman, vice-president, Overseas Motor Service Corp.; George E. Quisenberry, managing editor, El Automóvil Americano; George F. Bauer, secretary, Foreign Trade Committee National Automobile Chamber of Commerce; Gordon Lee, chief of Automotive Division, Department of Commerce; Glenn Davies, foreign manager General Motors Acceptance Corp., and W. F. Earl, advertising manager United States Rubber Export Co.

Speakers for the traffic conference include

PARKS GIVEN STATE AS DODGE MEMORIAL

DETROIT, Sept. 5—Dodge Brothers, Inc., has donated 11 tracts of forest and lake sites to the State of Michigan for motorist, picnic and camping parks. The parks total 627 acres of natural woods and lakes. All of the sites are within 50 miles of Detroit.

The purpose of the donation is to provide a memorial to the late John F. and Horace E. Dodge and to "give motorists places where they may have their picnics, games and bathing without being constantly driven from pillar to pillar by indignant owners of private property."

Ten of the eleven parks have large lakes or river frontage and the other is a rugged, almost mountainous parcel noted for its natural scenery. The parks will be known as Dodge Brothers State Parks Nos. 1, 2, etc. The presentation was made in a formal letter to Governor Alex. J. Grosbeck by chairman Howard E. Bloomer of the board of directors of Dodge Brothers.

A. L. Viles, general manager, Rubber Association of America; J. S. Marvin, general traffic manager, National Automobile Chamber of Commerce; H. E. McGivern, traffic manager, Motor Wheel Corp., and W. M. Twohig, traffic manager, Willard Storage Battery Co.

The final day, Friday, will be given up to golf, field sports and a motor trip, winding up with a dinner dance at the country home of the Automobile Club of Buffalo.

Anderson's Price Cuts Range from \$155 to \$455

ROCK HILL, S. C., Sept. 5—Lower prices are announced by the Anderson Motor Co., the reductions ranging from \$155 up to \$455. The new list is as follows:

	Old Price	New Price
5-pass. phaeton.....	\$1,650	\$1,495
Convertible roadster.....	1,650	1,495
7-pass. phaeton.....	1,795	1,595
4-pass. sport.....	1,750	1,595
2-pass. speedster.....	2,195	1,785
4-pass. ultra sport.....	2,395	1,945
4-pass. coupe.....	2,450	1,995
5-pass. sedan.....	2,550	1,995

BEST PAIGE AUGUST

DETROIT, Sept. 5 — Paige-Detroit Motor Car Co. reports its best August from the standpoint of output and sales. Roughly, 4000 cars were turned out in August as compared with 3600 in July. September is expected to produce 4200. Of this August total about two-thirds were Jewetts. It is estimated that present earnings are about \$500,000 a month. The company is said to be free of bank debt and to have \$5,470,000 in cash assets.

Equipment Business Better on Seaboard

At Fall Meeting Eastern Jobbers
Report It Ahead of Last Year—
Lines Narrowed

ATLANTIC CITY, Sept. 5—Automotive equipment business along the Atlantic seaboard is running ahead of last year, according to informal reports made by jobbers attending the fall meeting of the Eastern Automotive Equipment Association. New England jobbers reported the biggest increase in business, in some cases running as high as 30 per cent over last year in dollars and cents. The Pennsylvania and New Jersey districts also reported good sales. In New York city territory jobbers have had little, if any, improvement over the business in 1921, and competition, particularly on a price basis, has been keener than previously.

The meeting, presided over by Wallace G. Page of the American Motor Equipment Co. of Boston, president of the association, was addressed informally by Robert A. Stranahan, chairman of the merchandising committee of the Automotive Equipment Association, and Ray W. Sherman, merchandising director.

Urges Jobbers Help Dealers

Stranahan urged constant campaigning by jobbers to assist dealers in getting more rapid turnover of goods as the most important requirement in the process of building up business.

It developed that jobbers in the New England territory co-operatively have a sales promotion campaign well under way in connection with the Automotive Equipment Association movement. Plans are being developed in Pennsylvania, New Jersey and some of the other eastern territories.

Cut Down Lines

The meeting showed a steady gain in the trend toward narrowing distribution lines. Several jobbers reported that they had cut down the number of competing makes of articles they are handling in various lines and had increased rather than lost business as a result. They reported also that quite a number of manufacturers were leaning toward reduction of the number of jobbers handling their lines in given territories, with the result that competing makes of numerous lines of merchandise are now being pushed by competing jobbers instead of all jobbers handling virtually all makes and giving no particularly aggressive attention to any. It was the general opinion of the meeting that this standardization of lines will continue and will benefit both manufacturers and jobbers.

FRITZ HEADS ASSOCIATION

CHICAGO, Sept. 7—George Fritz, formerly manager of the Research Club, an organization of automotive jobbers, has been appointed business manager of the Association of Automotive Equipment Manufacturers.

A.A.A. of Air, Plan of Nation's Flyers

Association Will Be Formed at
Convention to Be Held
in Detroit

DETROIT, Sept. 5.—Definite plans for the formation of a national aeronautic association were announced to-day by Howard E. Coffin of this city who is chairman of the national advance committee on organization, in inviting 30 of the country's best known aviation experts, pilots and enthusiasts to form the executive committee in charge of arrangements for the convention to be held in Detroit during the national airplane races, Oct. 12, 13 and 14.

"All that the American Automobile Association, with its half million members, has done for motor car transportation, for good roads and for legislation, this new national body here proposed must do for aviation, and more," said Coffin.

He stated further:

Commercial aviation is a vital background in all military-naval plans for the national defense and the earliest possible steps must be taken for its encouragement. Federal laws for the control and regulation of all flying are an immediate and crying need. Life and property must be safeguarded and a foundation of public confidence laid for the commercial progress of this newest and fastest of the transportation arts. The attitude of mind of our Federal, State and municipal authorities must be directed along sane and constructive lines. We stand on the threshold of a new realm of navigation and travel, the uncharted ocean of the air.

Two Governors Invited

Among the 30 members invited to form the executive committee are two governors, who are themselves enthusiastic flyers. Governor James Hartness of Vermont, and Governor Ben Olcott of Oregon. E. M. Cowie, vice-president of the American Express Co., is also invited to serve, as is Frederick Patterson, president of the National Cash Register Co., Dr. Joseph Ames, of the Bureau of Standards, J. Howland Bibbens, manager of the transportation department of the United States Chamber of Commerce and Glenn Martin, famous airplane designer, of Cleveland, are also among the number.

A number of famous World War pilots, some of them America's best known "aces," are invited to represent the flyers on the committee.

Detroit is represented on the committee by Sidney D. Waldon, president of the Detroit Aviation Society and also president of the National Air Association, formed at Omaha last year. The National Air Association proposes to merge its membership, together with that of the Aero Club of America, into the new national aeronautic association.

FLIES ACROSS CONTINENT

SAN DIEGO, CAL., Sept. 5.—A flight across the continent with only one stop—

that's the achievement of Lieut. James H. Doolittle, who flew a De Havilland plane from Pablo Beach, Jacksonville, Fla., to San Diego in 21 hr. 18 min. The distance is approximately 2275 miles, and the average was nearly 100 m.p.h. Doolittle's one stop was at San Antonio, Tex., where he remained for 1 hr. 13 min.

FINANCIAL NOTES

Latex Tire & Rubber Co., Fond du Lac, Wis., will market a bond issue of \$125,000 to provide capital for extension of production. More than 75 per cent of the issue already has been subscribed for by present stockholders. The business was established about three years ago. The plant and business are valued at more than \$750,000. Business on the books is sufficient to keep the factory busy at full capacity for five to six months. With new capital a larger volume now available can be handled.

Stromberg Carburetor Co. announces a quarterly dividend of \$1 a share payable Oct. 2 to stock of record Sept. 18. This is a resumption of dividend payments at the same rate which prevailed from July, 1919 to October, 1920. In January of last year the rate was reduced to 50 cents quarterly and in the following quarter payments were suspended entirely. Up to the present no dividends have been paid since the first quarter of last year.

Paige Detroit Motor Car Co. has declared the regular quarterly dividend of 1½ per cent on preferred, payable Oct. 1 to stock of record Sept. 15. It has declared a dividend of 3 per cent on the common stock payable Oct. 1 to stock of record Sept. 30.

Fisher Body Ohio Co. has declared a quarterly dividend of \$2 a share on the preferred stock payable Oct. 1 to stock of record Sept. 21. This is the first dividend paid since the expiration of the parent company's guarantee.

Reynolds Spring Co. directors have declared a dividend of 1½ per cent on the preferred "A" and "B" stock, payable Sept. 30, 1922, to stockholders of record at the close of business Sept. 18.

Mack Trucks, Inc., has declared the regular quarterly dividend of 1½ per cent on the first and second preferred stocks, payable Oct. 1 to holders of record Sept. 20.

J. I. Case T. M. Co. has declared the regular quarterly dividend of \$1.75 a share on the preferred stock, payable Oct. 1 to stock of record Sept. 11.

Motor Wheel Corp. has declared the usual quarterly dividend of 2 per cent on common, payable Sept. 20 to holders of record Sept. 11.

Kelly Springfield Tire Co. has declared a quarterly dividend of \$1.50 a share on the 6 per cent preferred stock, payable Oct. 2, 1922, to stockholders of record Sept. 15.

Buda Co. announces a 1½ per cent dividend payable Oct. 1 to stock of record Sept. 20.

NO PACKARD VACATION

DETROIT, Sept. 5.—The annual two weeks shut down of the plant of the Packard Motor Car Co. will not take place this year. Production demands are so pressing that members of the entire factory organization have voluntarily given up their vacations in order to get out the cars. As a reward the company will give the men bonuses.

BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.

Last week the rates for call loans ranged between 3¼ per cent and 5 per cent as compared with 3¼ per cent to 4½ per cent. There was an increased firmness noted toward the end of the week, responsibility for which might doubtless be attributed to the preparations for Sept. 1 dividend and interest payment. The slight stiffening in rates is believed in some quarters to be only temporary. In time money, 60 days' maturities continued to be quoted at 4¼ per cent, 90 days' and 4 months' at 4¼ per cent to 4½ per cent, as compared with 4¼ per cent, and 5 and 6 months' maturities at 4½ per cent to 4¾ per cent, as compared with 4½ per cent in the previous week. The prime commercial rate remained at 3¼ per cent to 4 per cent.

The outstanding events in the coal mining industry last week were the settlement of the anthracite coal strike and the return to work of the bituminous miners.

The various sections of the United States, with the exception of the South, showed increases last week in the number of failures, the total being 376, as compared with 348 in the previous week and 346 for the corresponding week a year ago. The number of defaults involving liabilities of \$5,000 or more was 223, or 59.3 per cent of the total failures for the week, as compared with 190, or 54.6 per cent for the previous week, and 189, or 54.6 per cent for the corresponding week a year ago.

Despite the rail and labor disturbances which interfered with general transportation during the whole month of August, car loadings of merchandise and miscellaneous freight showed an increase of 3639 in the week ending Aug. 10, and coal loadings, an increase of 2600. Total coal loadings for that week aggregated 81,959, as compared with 152,513 cars for the corresponding week last year and 204,178 two years ago, while total loadings amounted to 856,219 against 815,147 cars for the corresponding week last year and 968,103 cars two years ago.

Patents Should Extend to Europe, Consul Says

WASHINGTON, Sept. 6.—The need for extension of American patents on automotive products in foreign countries is emphasized in a letter received to-day by the Department of Commerce from an American Consul in Portugal. It is reported that certain firms in Portugal buy American truck bodies and use them for patterns.

The bodies are then made locally at prices averaging from one-half to one-third of the present American prices. It is suggested that American manufacturers of truck bodies secure production through obtaining patent rights in European countries.

Milk Producers Get Fenn's Truck Data

If Plan Is Adopted Sales of Vehicles Will Be Greatly Stimulated

WASHINGTON, Sept. 6—Definite plans for the haulage of milk products by motor trucks were submitted to the National Milk Producers Association today by F. W. Fenn, secretary of the motor truck committee of the National Automobile Chamber of Commerce.

This report is very comprehensive in that it covers thoroughly a new field for motor transportation of milk and milk products. It gives the concise account of motor truck operation costs from one ton to seven and one-half tons, covering the operation of costs from per mile to per day, week, month and year.

The report is submitted from the standpoint of the user and not manufacturer of trucks, and if adopted by the milk producers will mean sales of trucks on an enormous scale throughout the country.

Big Saving in Plan

The data prepared under Fenn's direction for the milk producers involves a plan whereby the co-operative organizations of milk producers will own their own trucks and manage and operate the motor transportation system. Figures are given to show that the plan if developed will result in tremendous savings to milk producers.

The report shows that it is possible to transport milk products from farm to city markets over distances up to 50 or 60 miles at less than half the cost of rail transportation. The success which has attended the inauguration of motor milk routes in Syracuse, N. Y., and Cincinnati, Ohio, has aroused the farming interests to the possibilities of motor truck transportation.

A chapter of the report shows that in some large centers fully 90 per cent of the milk supply is now being received by motor trucks. Information given the motor truck committee by operators and owners of milk trucks shows that Milwaukee is enjoying milk at 11 cents a quart while the average American city is paying approximately 13 cents, owing to the high rail freight rates.

Glass Lined Tanks in Plan

Of the ideas submitted by the National Automobile Chamber of Commerce one concern specially built glass lined tanks which have proved efficient in actual operation. It is stated that milk transported in tanks over the highways covering a distance of 20 to 40 miles suffers very little change in temperature, the average being about two degrees Fahrenheit. In localities where glass-lined tanks are used, they are mounted on a motor truck chassis back of which is hauled a trailer, similarly equipped, increasing the load capacity and cutting down the cost of transportation.

Copies of the report will be printed at an early date and distributed to the members of the association for their consideration.

The failure of the Interstate Commerce Commission to reduce the rates on milk products early this summer, when a general freight rate reduction of 10 per cent was authorized turned attention of milk producers to a cheaper and efficient method of transportation—the motor truck.

INDUSTRIAL NOTES

Western Reserve Cotton Mills Co., following installation of \$75,000 worth of new machinery for weaving at its tire fabric plant, Millen, Ga., started production at full capacity on a 24-hour day and night schedule the last week in August. So rapidly has the tire industry improved the past few weeks that the mills have been compelled to ship several 10,000-pound fabric orders to the Mason Tire & Rubber Co., at Kent, Ohio, by express, to enable the company to keep up with the increasing demand. The Millen mills are now using cord wood for fuel purposes because of the coal shortage.

Cropper-Kinney Auto Spring Co. has been incorporated at Lebanon, Ohio. George Cropper, president and treasurer has been connected with the Milburn Wagon Co., on its sales force, for the past 25 years. L. H. Kinney, vice-president and general superintendent had charge of the Studebaker spring factories for over 12 years. Lately he was president of the Cincinnati Auto Spring Co. A. M. Kinney will be assistant superintendent. The company expects to be in operation by Oct. 15 and will manufacture the Star Brand spring.

Federal Rubber Co., Cudahy, Wis., has started construction work on three additional floors of a new seven-story manufacturing addition, 120 x 250 ft., the foundations and first floor of which were erected last year. The structure is projected as a seven-story building, and the remaining three stories will be built early in 1923. It will represent an investment of about \$400,000, including equipment.

Dallmann Machinery & Manufacturing Co., Milwaukee, has purchased the rights to the Smith sliding gear and clutch heretofore manufactured by the Smith Sliding Gear & Clutch Co. of North Lake, Wis. The Smith company will receive a royalty on the Dallmann production. The North Lake works will concentrate on the manufacture of pulleys for Fordson tractors and similar mechanical devices.

Firestone Tire & Rubber Co. of Canada, Ltd., will place its new plant at Hamilton, Ont., in operation Sept. 15. This is the first unit of an extensive manufacturing development. The plant will be devoted exclusively to the manufacture of passenger car and truck tires. Between 300 and 400 Canadian hands will be employed at the start.

Borg & Beck Co., clutch manufacturer, plans to transfer its recently acquired **Hough Mechanical Hoist Co.** from Chicago to Moline with a force of 100 men. Production is scheduled to start in 60 or 90 days. The hoist is used to elevate dumping wagon bodies. Earl Hough has joined Borg & Beck as sales manager of the product.

Corrocan-Victor Co. of Cincinnati, manufacturer of automobile lamps, tool boxes and automotive devices, has opened a sales office in the General Motors Building, Detroit.

METAL MARKETS

A new chapter of steel market history is being written. Of this there is not the least doubt, but there is doubt whether the caption "inflation" which many astute market observers have chosen as befitting the impending developments will be justified by the latter. Those who are positive in their opinion that inflation has set in are equally positive that it will not endure for any appreciable length of time. To many equally discerning beholders of steel market conditions it looks as though inflation ill fits the prevailing and impending state of affairs.

Inflation presupposes buyers eagerly falling over one another to secure steel at any price. So far, at least, there is no indication of such a condition coming to pass. What has taken place is that production costs have unexpectedly taken a sharp upward turn. The steel industry is now seeking to translate these advanced production costs into selling prices at which it can make both ends meet and continue to operate a fair percentage of its capacity. So far consumers have shown no disposition to place tonnage orders at these higher prices.

Requirements for building operations are certain to shrink more and more as the colder weather approaches. The railroads undoubtedly are in need of considerable steel and of considerable steel containing equipment. Whether they will be financially in a position to cover their wants more liberally than has been the case heretofore remains to be seen.

To a very large extent the attitude of the automotive industries toward the steel market will determine whether it is headed for a period of actual inflation or whether competition among the steel mills for what business is obtainable will result in the leading interest's prices becoming a convenient level for cutting under rather than, as at present, one on which to base higher quotations. Of course, the steel industry is only a cog in the mechanism of commodity markets, and, if there should ensue in the next few weeks a general tendency toward inflation, steel prices would be buoyed up by the tide. The opinion so frequently encountered these days that the leaders of the steel industry have thrown up the sponge and are ready to let inflation take its course is obviously faulty. Judge Gary is as uncompromisingly opposed to-day to everything that may tend to bring about a recrudescence of inflation as he was two years ago when he led the movement to bring about a return to sanity in the matter of commodity prices.

Pig Iron.—For the time being there is no market. Automotive foundries urgently in need of fill-in tonnages are obliged to go scouting for pig iron and drive the best bargain they can. Many melters are having recourse to more and more scrap.

Steel.—Prices for nearly all automotive steels are irregular. For sheet bars prices up to \$40 are heard. Hot-rolled strip is held at 2.75c., base, and cold-rolled at 4.25c. Cold-drawn bars are held at 2.25 @ 2.50c., Pittsburgh, with a \$5 per ton advance predicted here and there. Higher bolt and nut prices are also spoken of.

Copper.—Further advances in wrought copper and brass products have become general. Most mills have orders on their books to keep them running until November. The raw metal market is at a standstill.

Aluminum.—A brisk demand for aluminum scrap is noted from foundries making passenger car step plates. Aluminum sheets are quiet with prices firm.

Calendar

SHOWS

- Sept. 23-30—New York, Closed Car Show, Grand Central Palace.
- Oct. 7-14—New York, Electrical and Industrial Exposition, Grand Central Palace.
- Oct. 21-28—Washington, D. C., Annual Closed Car Salon, Convention Hall, under the auspices of the Washington Automotive Trade Association.
- Nov. 13-18—Chicago, Annual Show and Meeting of the Automotive Equipment Association.
- Dec. 3-9—New York, Eighteenth Annual Automobile Salon, Commodore Hotel.
- Jan. 6-13—New York, National Automobile Show, Grand Central Palace, under auspices of National Automobile Chamber of Commerce.
- Jan. 8-13—New York, Body Builders Show, Twelfth Regiment Armory, under the auspices of the Automobile Body Builders Association.
- Jan. 27-Feb. 3—Chicago, Annual Automobile Salon.

Jan. 27-Feb. 3—Chicago, National Automobile Show, under auspices of National Automobile Chamber of Commerce, Coliseum and First Regiment Armory.

FOREIGN SHOWS

- Sept. 1922—Rio de Janeiro, Brazil, Automobile Exhibits in Connection with the Brazilian Centenary Association Automobillista Brasileira.
- Sept. 15-20—The Hague, Automobile Show.
- September—Buenos Aires, Argentina, Annual Exhibition, Sociedad Rural Argentina.
- Oct. 4-15—Paris, Automobile Show, Grand Palais.
- Nov. 3-11—London (Olympia), Automobile Show.
- Nov. 29-Dec. 4—London (Olympia), Cycle and Motorcycle Show, British Cycle Motors, The Tower, Warwick Road, Coventry.
- November—Buenos Aires, Argentina, Annual Exhibition, Automovil Club Argentino.

Jan. 13-24—Brussels, Sixteenth International Automobile and Cycle Exposition, Palais du Conquanteinaire.

CONVENTIONS

- Sept. 13, 14, 15—Buffalo, Lafayette Hotel, Annual credit meeting, Motor and Accessory Manufacturers Ass'n.
- Sept. 14-15—Chicago, National Used Car Conference, National Association of Automobile Show and Association Managers, Congress Hotel.
- Sept. 18-23, 1922—Rome, Italy, Second Annual Meeting of the International Chamber of Commerce.
- Oct. 2-7—Detroit, Fourth International Steel Exposition and Convention of the American Society for Steel Treating and the American Drop Forging Institute, General Motors Building.
- Oct. 7-14—Detroit, Second National Aero Congress and National Airplane Races.
- Oct. 18-20—Chicago, National Association of Farm

Equipment Manufacturers, Congress Hotel.

Oct. 26-28—Washington, Second National Conference for the Study of Highway Engineering and Highway Transport Education.

RACES

- Sept. 10—Monza, Italy, Italian 500-mile Grand Prix Race.
- Sept. 16—Kansas City Speedway, 300 mi. International Speed Race.

S. A. E. MEETINGS

- Sept. 16—Metropolitan Section, Annual Outing, West Point; Sept. 21—Automobile Club of America, George A. Round, Lubrication.
- Sept. 22—New England Section, Engineers Club, Boston, Starting and Lighting Equipment, Louis Ehrlich.
- Sept. 29—Detroit Section, Lubrication, A. A. Bull.
- Oct. 6—Aberdeen Proving Ground, Md.—Oct. 26-27, Detroit, General Motors Building.
- Jan. 9-12—New York, Annual Meeting.

T.W. Warner Is Buyer of New Process Gear

SYRACUSE, N. Y., Sept. 6—T. W. Warner, president of the Warner Corp. of Muncie, Ind., and Toledo, bought the New Process Gear division of the Willys Corp. at court sale to-day. He was the only bidder, and the price paid was \$1,904,000, which was \$4,000 more than the court's upset price. The sale will come up for confirmation before Federal Judge Cooper in Albany Sept. 16.

It is said that this Syracuse plant will become a part of the Warner Corp. which will be enlarged. In all likelihood, there will be an issue of stock to finance this sale, and it is probable that this stock will be marketed through the Durant corporation, W. C. Durant being interested in the Warner company.

The balance sheet of the New Process Gear Co. shows assets of \$2,766,217. Against this there is due the Willy company a total of \$170,000. The land and buildings were appraised at \$790,000; machinery and equipment, \$650,000; unfinished goods, \$588,354; cash, \$622,598; accounts receivable, \$329,717 from the Willys company and \$52,000 from Durant Motors, Inc.

The New Process plant here has been producing gears for the Star and Durant cars for some time and has been working at full capacity.

New Franklin Series Has Victoria Coupe

SYRACUSE, N. Y., Sept. 7—In addition to the changes in the engine and chassis, which were fully described in the Aug. 31 issue of AUTOMOTIVE INDUSTRIES, the new Franklin models show the addition of an entirely new body, the Victoria Coupe, which is a three passen-

ger job. The price of the new coupe is \$2,750.

Some changes have also been made in the exterior appearance of the entire line. Most noticeable of these is the location of the front license plate bracket, which is a forging extending over in front of the left front wheel, so as to remove any interference of air supply to the cooling system. Watson stabilizers are also standard equipment on all models.

Canada Will Produce 100,000 Cars in 1922

TORONTO, Sept. 1—That Canada's automotive investment exceeds \$600,000,000; that motor vehicles carry at least five times the number of passengers transported by all the railroads combined in Canada, that the Canadian automotive industry will produce approximately 100,000 cars this year and export from 40,000 to 50,000 cars, that Canada with over half a million cars and trucks ranks second only to the United States in motorization; that every unit entering Canadian made cars will be made in the Dominion in the near future and that the country's motor population will double and triple within a few years are some of the high lights of the address by R. S. McLaughlin, president of the Automotive Industries of Canada, delivered at the Directors' Luncheon of the Canadian National Exhibition.

PACKARD BUILDING DOCK

DETROIT, Sept. 5—The Packard Motor Car Co. is building a railroad loading dock along the inner belt line of the Michigan Central railroad at its plant in this city. The new dock is made of steel and concrete and is 702 ft. long and 22 ft. wide. It will have a capacity of 30 railroad cars at a time, providing for the loading of 90 automobiles at each clearing.

Curtiss Keeps Glider in Air for 9 Seconds

NEW YORK, Sept. 6—What is believed to be the first flight of an aquatic glider was accomplished to-day over Manhasset Bay, near Port Washington, L. I., when Glenn Curtiss made a sustained flight lasting nine seconds. Towed by a motor boat at a speed of 35 m.p.h., and while at a height of about 20 ft. above the water, Curtiss cast loose the tow rope and the glider remained in the air for nine seconds.

This flight was made after four unsuccessful trials during which there was no wind whatsoever. Returning to the hangar in tow, Curtiss discovered a puff of wind which led him to try for the fifth time with the results recorded above.

The glider used is one which has just been completed by Curtiss and which has been described in these columns. Except for its blunt nose, it is an exact copy of the N.C. boats built by the Curtiss company for the Navy. Its weight empty is 140 lbs. and it is operated by means of a system of shoulder controls.

DODGE TO EXPAND

DETROIT, Sept. 6—A manufacturing building costing about \$1,500,000 and having a capacity of 500,000 sq. ft. will be added to the Dodge Brothers' plant, which will increase the capacity from 650 cars a day at present to between 800 and 900. The total production for the year will be 160,000, it is estimated, as compared with 141,000, the best previous year.

DELIVERING STARS

NEW YORK, Sept. 6—Actual deliveries of Star cars to purchasers are now being made. The Star is in production at three plants now—Lansing, Leaside and Long Island City.